Sun Ethernet Fabric Operating System

VRRP Administration Guide

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Using This Documentation

VRRP is an implementation of the RFC 2338 specification. VRRP provides full support of the draft VRRP MIB specification and enables network load balancing. This guide describes the basic and advanced configuration tasks of VRRP. A basic knowledge of the protocol is a prerequisite.

- "Related Documentation" on page 1
- "Acronyms and Abbreviations" on page 2
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Related Documentation

Documentation	Links
All Oracle products	http://oracle.com/documentation
Sun Blade 6000 Ethernet Switched NEM 24p 10GbE	http://www.oracle.com/pls/topic/lookup?ctx=SB6K-24p-10GbE
Sun Network 10GbE Switch 72p	http://www.oracle.com/pls/topic/lookup?ctx=SN-10GbE-72p
Sun Blade 6000 modular system	http://www.oracle.com/pls/topic/lookup?ctx=sb6000
Oracle Integrated Lights Out Manager (Oracle ILOM) 3.0	http://www.oracle.com/pls/topoc/lookup?ctx=ilom30

For detailed information about the commands and options described in this document, refer to the *Sun Ethernet Fabric Operating System CLI Base Reference Manual*.

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

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.

Command Mode	Access Method	Prompt	Exit Method
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.

Feedback

Provide feedback on this documentation at:

http://www.oracle.com/goto/docfeedback

Support and Accessibility

Description	Links
Access electronic support through My Oracle Support	http://support.oracle.com For hearing impaired: http://www.oracle.com/accessibility/support.html
Learn about Oracle's commitment to accessibility	http://www.oracle.com/us/corporate/accessibility/index.html

Protocol Description

This section provides an introduction to protocol description:

- "Introduction" on page 5

Introduction

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.

SEFOS VRRP is Oracle's implementation of VRRP.

Configuring VRRP

The following section provides an introduction to configuring VRRP:

- "Introduction" on page 7

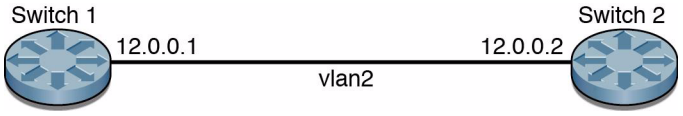
Introduction

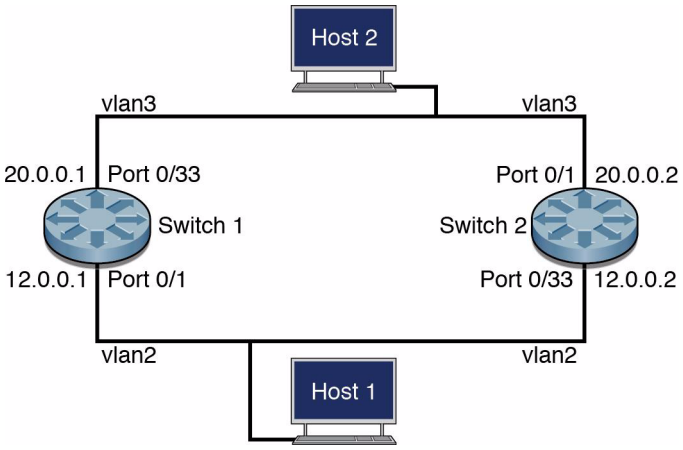
The following procedures show how to configure VRRP:

- "VRRP Topology" on page 7
- "Configuration Guidelines" on page 8
- "Default Configuration Values" on page 9
- "Create VRRP Instance Over an Interface" on page 9
- "Configure Additional Associated IP Addresses to a VRRP Instance" on page 12
- "Configure VRRP Priority" on page 13
- "Enable Preempt Mode" on page 15
- "Configure Authentication Password for VRRP Tickets" on page 16
- "Configure VRRP Advertisement Interval" on page 17
- "Configure VRRP (Linux Example)" on page 19

VRRP Topology

The following figures are examples of the VRRP topology.





Configuration Guidelines

Refer to the Sun Ethernet Fabric Operating System CLI Enterprise Reference Manual for a complete set of commands and options for configuring VRRP.

The command `vrrp vrid(1-255) ipv4 ip-address` must be entered for the current interface (with the correct `vrid`) before the execution of any commands in Interface Configuration mode.

This section shows the default configuration values:

Default Configuration Values

Feature	Default Setting
VRRP status	Disabled
VRRP Priority	100
Preempt mode	Enabled
Authentication	None
Advertisement interval	1 second

▼ Create VRRP Instance Over an Interface

See the first figure in "VRRP Topology" on page 7 for the topology used in this example.

1. Enable VRRP to configure an instance over a VLAN interface.

```
SEFOS# configure terminal
SEFOS(config)# router vrrp
```

2. Select an interface to configure VRRP and enter Interface Configuration mode.

```
SEFOS(config-vrrp)# interface vlan 2
```

3. Create a VRRP instance and specify a virtual IP address.

```
SEFOS(config-vrrp-if)# vrrp 2 ipv4 12.0.0.5
SEFOS(config-vrrp-if)# end
```

4. View the VRRP configurations and states in switch 1.

```
SEFOS# show vrrp interface vlan 2
P indicates configured to preempt
Interface  vrID Priority  P  State   Master Addr     VRouter Addr
---------  ---- --------  -  -----   -----------     ------------
vlan2      1     100       P  Backup   12.0.0.5       12.0.0.5
```

Alternatively, you can display the detailed configuration information.

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Backup
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated Ip Addresses :
----------------------
12.0.0.5
Advertise time is 1 secs
Current priority is 100
Configured priority is 100, may preempt
```

You can display the configuration statistics.

```
SEFOS# show vrrp interface vlan 2 statistics
vlan2  - vrID 1
---------------
Transitions to Master                : 0
Advertisements Received              : 441
Advertise Internal Errors            : 0
Authentication Failures              : 0
TTL Errors                           : 0
Zero Priority Packets Received       : 0
Zero Priority Packets Sent           : 0
Invalid Type Packets Received        : 0
Address List Errors                  : 0
Invalid Authentication Type          : 0
Authentication Type Mismatch         : 0
Packet Length Errors                 : 0
```

The counter for Advertisements Received increases for every second in switch 1.

5. View the VRRP configurations in switch 2.

```
SEFOS# show vrrp interface vlan 2
P indicates configured to preempt

Interface  vrID Priority  P  State   Master Addr   VRouter Addr
---------  ---- --------  -  -----   -----------   ------------
vlan2       1    100      P  Master   local        12.0.0.5
```

Alternatively, you can display the detailed configuration information.

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Master
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
Advertise time is 1 secs
Current priority is 100
Configured priority is 100, may preempt
```

You can display the configuration statistics.

```
SEFOS# show vrrp interface vlan 2 statistics
vlan2  - vrID 1
---------------
Transitions to Master                 : 1
Advertisements Received               : 0
Advertise Internal Errors             : 0
Authentication Failures               : 0
TTL Errors                            : 0
Zero Priority Packets Received        : 0
Zero Priority Packets Sent            : 0
Invalid Type Packets Received         : 0
Address List Errors                   : 0
Invalid Authentication Type           : 0
Authentication Type Mismatch          : 0
Packet Length Errors                  : 0
```

The counter for Advertisements Received does not increase for every second in switch 2. Maximum number of instances allowed in a router is 10.

▼ Configure Additional Associated IP Addresses to a VRRP Instance

A VRRP instance can be associated with more than one IP address. When the router becomes master for an instance, then it replies to the ARP request(s) for all the associated IP addresses.

See the first figure in "VRRP Topology" on page 7 for the topology used in this example.

1. **In both switches, configure additional associated IP addresses to a VRRP instance.**

   a. **Enter Global Configuration mode.**

```
SEFOS# configure terminal
```

   b. **Enable VRRP and enter VRRP Configuration mode.**

```
SEFOS(config)# router vrrp
```

   c. **Select an interface to configure VRRP and enter Interface Configuration mode.**

```
SEFOS(config-vrrp)# interface vlan 2
```

   d. **Create a VRRP instance and specify a virtual IP address to configure.**

```
SEFOS(config-vrrp-if)# vrrp 1 ipv4 12.0.0.5
```

   e. **Add an additional associated IP address 12.0.0.6 to the VRRP instance.**

```
SEFOS(config-vrrp-if)# vrrp 1 ipv4 12.0.0.6 secondary
```

   f. **Exit Interface Configuration mode.**

```
SEFOS(config-vrrp-if)# end
```

2. **View the VRRP associated IP addresses in switch 1.**

```
SEFOS# show  vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
```

```
State is Backup
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 1 secs
Current priority is 100
Configured priority is 100, may preempt
```

3. View the VRRP associated IP addresses in switch 2.

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Master
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 1 secs
Current priority is 100
Configured priority is 100, may preempt
```

Maximum number of associated IP addresses per instance is 10.

▼ Configure VRRP Priority

See the first figure in "VRRP Topology" on page 7 for the toplology used in this example. You can configure a VRRP instance with a priority so that the router with higher priority will become the master for that instance. You can configure the priority from 1 to 254, with 1 being the lowest priority. A priority of 255 is used for the router that owns the associated IP addresses.

1. Type the following commands in switch 1 to configure VRRP instance 1's priority as 200.

a. Enter Global Configuration mode.

```
SEFOS# configure terminal
```

b. Enter Router Configuration mode.

```
SEFOS(config)# router vrrp
```

c. Enter Interface Configuration mode for VLAN 2.

```
SEFOS(config-vrrp)# interface vlan 2
```

d. Configure the priority as 200.

```
SEFOS(config-vrrp-if)# vrrp 1 priority 200
```

e. Exit Interface Configuration mode.

```
SEFOS(config-vrrp-if)# end
```

2. Type the following commands in switch 2 to configure the priority for VRRP instance 1 as 150.

a. Enter Global Configuration mode.

```
SEFOS# configure terminal
```

b. Enter Router Configuration mode.

```
SEFOS(config)# router vrrp
```

c. Enter Interface Configuration mode for VLAN 2.

```
SEFOS(config-vrrp)# interface vlan 2
```

d. Configure the priority as 150.

```
SEFOS(config-vrrp-if)# vrrp 1 priority 150
```

e. Exit Interface Configuration mode.

```
SEFOS(config-vrrp-if)# end
```

3. **View the priority in switch 1.**

```
SEFOS# show vrrp interface vlan 2
P indicates configured to preempt

Interface vrID Priority  P  State  Master Addr   VRouter Addr
--------- ----  -------- -  -----  -----------   ------------
vlan2     1      200      P  Master local         12.0.0.5
```

4. **View the priority in switch 2.**

```
SEFOS# show  vrrp  interface  vlan 2
P indicates configured to preempt

Interface vrID Priority P  State   Master Addr     VRouter Addr
--------- ---- -------- -  -----   -----------     ------------
vlan2      1      150    P  Backup   12.0.0.5       12.0.0.5
```

▼ Enable Preempt Mode

See the first figure in "VRRP Topology" on page 7 for the toplology in this example. You can configure VRRP to preempt the existing router. This means that if a new VRRP router is added to the network with priority higher than the existing routers, then the new router becomes the master. If preemption is disabled, then the new router will not become a master. This router becomes master only when the current master is down, that is, only when it does not receive any advertisement packets from the current master. By default, preempt mode is enabled.

1. **In switch 1 and switch 2, enable preempt mode.**

```
SEFOS# configure terminal
SEFOS(config)# router vrrp
SEFOS(config-vrrp)# interface vlan 2
SEFOS(config-vrrp-if)# vrrp 1 preempt
SEFOS(config-vrrp-if)# end
```

2. **View the preemption status in switch 1.**

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Master
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
```

```
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 1 secs
Current priority is 200
Configured priority is 200, may preempt
```

3. View the preemption status in switch 2.

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Backup
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 1 secs
Current priority is 150
Configured priority is 150, may preempt
```

▼ Configure Authentication Password for VRRP Tickets

See the first figure in "VRRP Topology" on page 7 for the topology in this example. You can configure VRRP text authentication to authenticate VRRP packets. An advertisement packet will get discarded if the authentication key in the packet does not match with the locally configured value.

1. In switch 1 and in switch 2, configure the authentication password or key as text1.

```
SEFOS# configure terminal
SEFOS(config)# router vrrp
SEFOS(config-vrrp)# interface vlan 2
SEFOS(config-vrrp-if)# vrrp 1 text-authentication text1
SEFOS(config-vrrp-if)# end
```

2. View the authentication key configured in switch 1.

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Master
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 1 secs
Current priority is 200
Configured priority is 200, may preempt
Configured Authentication
Authentication key is text1
```

3. View the authentication key configured in switch 2.

```
SEFOS# show  vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Backup
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 1 secs
Current priority is 150
Configured priority is 150, may preempt
Configured Authentication
Authentication key is text1
```

▼ Configure VRRP Advertisement Interval

See the first figure in "VRRP Topology" on page 7 for the topology in this example. You can configure VRRP master router to send an advertisement packet at regular intervals to convey to the backup routers that the master is alive. By default, this interval is 1 second. You can configure this value in the range 1 to 255. In this example, you set the advertisement interval to 5 seconds on VLAN 2.

1. In both switches, configure the advertisement interval.

```
SEFOS# configure terminal
SEFOS(config)# router vrrp
SEFOS(config-vrrp)# interface vlan 2
SEFOS(config-vrrp-if)# vrrp 1 timer 5
SEFOS(config-vrrp-if)# end
```

2. View the advertisement timer interval configured in switch 1.

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Master
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 5 secs
Current priority is 200
Configured priority is 200, may preempt
Configured Authentication
Authentication key is text1
```

3. View the advertisement timer interval configured in switch 2.

```
SEFOS# show vrrp interface vlan 2 detail
vlan2  - vrID 1
---------------
State is Backup
Virtual IP address is 12.0.0.5
Virtual MAC address is 00:00:5e:00:01:01
Master router is 12.0.0.5
Associated IpAddresses :
----------------------
12.0.0.5
12.0.0.6
Advertise time is 5 secs
Current priority is 150
Configured priority is 150, may preempt
Configured Authentication
Authentication key is text1
```

▼ Configure VRRP (Linux Example)

See the second figure in "VRRP Topology" on page 7 for the topology in this example. Hosts are used to verify that the data is forwarded correctly. In this example, you use a Linux machine as a host. Port 1 of switch 1, port 1 of switch 2, and the host 1 are connected through a hub. Similarly, port 2 of switch 1, port 2 of switch 2, and host 2 are connected through another hub. In this topology, switch 1 and switch 2 act as a virtual router in vlan 2 and vlan 3. The virtual IP is `12.0.0.3` for vlan 2 and the IP is `20.0.0.3` for vlan 3. The priority of switch 1 is 150 and the priority of switch 2 is 125. Initially, switch 1 will forward the data traffic between host 1 and host 2. If switch 1 fails to operate for some reason, switch 2 will start forwarding the packets.

Note – Note that in the output of the show commands, the sections concerning the default VLAN (vlan 1) and the ports that are members of that VLAN are omitted.

---

1. **In switch 1, configure vlan 2 and vlan 3 and assign the member ports and IP addresses. Be sure to disable spanning tree and GVRP, if they are running in the switch.**

```
SEFOS# configure terminal
SEFOS(config)# no spanning-tree
SEFOS(config)# set gvrp disable
SEFOS(config)# vlan 2
SEFOS(config-vlan)# ports extreme-ethernet 0/1 untagged
extreme-ethernet 0/1
SEFOS(config-vlan)# exit
SEFOS(config)# interface vlan2
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 12.0.0.1 255.0.0.0
SEFOS(config)# no shutdown
SEFOS(config-if)# exit
SEFOS(config-if)# vlan 3
SEFOS(config-if)# ports extreme-ethernet 0/33 untagged
extreme-ethernet 0/33
SEFOS(config-if)# interface extreme-ethernet 0/33
SEFOS(config)# switchport access vlan 3
SEFOS(config-vlan)# no shutdown
SEFOS(config-vlan)# exit
SEFOS(config)# interface vlan 3
SEFOS(config-if)# shutdown
SEFOS(config-if)# ip address 20.0.0.1 255.0.0.0
SEFOS(config-if)# no shutdown
SEFOS(config)# end
```

2. **Verify the VLAN configurations.**

```
SEFOS# show ip interface
vlan2 is up, line protocol is up
Internet Address is 12.0.0.1/8
SEFOS# show vlan briefBroadcast Address  12.255.255.255
Vlan database
-------------
Vlan ID             : 2
Member Ports        : Ex0/1
Untagged Ports      : Ex0/1
Forbidden Ports     : None
Name                :
Status              : Permanent
----------------------------------
Vlan ID             : 3
Member Ports        : Ex0/33
Untagged Ports      : Ex0/33
Forbidden Ports     : None
Name                :
Status              : Permanent
----------------------------------

vlan3 is up, line protocol is up
Internet Address is 20.0.0.1/8
Broadcast Address  20.255.255.255
```

3. **In switch 2, configure vlan 2 and vlan 3 and assign the ports and IP address. Be sure to disable spanning tree and GVRP if they are running in the switch.**

```
SEFOS# configure terminal
SEFOS(config)# no spanning-tree
SEFOS(config)# set gvrp disable
SEFOS(config)# vlan 2
SEFOS(config-vlan)# ports extreme-ethernet 0/33 untagged
extreme-ethernet 0/33
SEFOS(config-vlan)# exit
SEFOS(config)# interface extreme-ethernet 0/33
SEFOS(config-if)# switchport access vlan 2
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)# interface vlan 2
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)# exit
```

```
SEFOS(config)# vlan 3
SEFOS(config-vlan)# ports extreme-ethernet 0/1 untagged
extreme-ethernet 0/1
SEFOS(config-vlan)# exit
SEFOS(config)# interface extreme-ethernet 0/1
SEFOS(config-if)# switchport access vlan 3
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)# interface vlan 3
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
```

4. Verify the configuration.

```
SEFOS# show ip interface
vlan2 is up, line protocol is up
Internet Address is 12.0.0.2/8
SEFOS# show vlan briefBroadcast Address  12.255.255.255
Vlan database
-------------
Vlan ID             : 2
Member Ports        : Ex0/33
Untagged Ports      : Ex0/33
Forbidden Ports     : None
Name                :
Status              : Permanent
----------------------------------
Vlan ID             : 3
Member Ports        : Ex0/1
Untagged Ports      : Ex0/1
Forbidden Ports     : None
Name                :
Status              : Permanent
----------------------------------

vlan3 is up, line protocol is up
Internet Address is 20.0.0.2/8
Broadcast Address  20.255.255.255
```

5. In switch 1, verify the connectivity between switch 1 and switch 2.

```
SEFOS# ping 12.0.0.2
Reply Received From :12.0.0.2, TimeTaken : 50 msecs
```

```
Reply Received From :12.0.0.2, TimeTaken : 40 msecs
SEFOS# ping 20.0.0.2Reply Received From :12.0.0.2, TimeTaken : 40
msecs
Reply Received From :20.0.0.2, TimeTaken : 50 msecs
Reply Received From :20.0.0.2, TimeTaken : 30 msecs
Reply Received From :20.0.0.2, TimeTaken : 30 msecs
```

6. **Enable VRRP instances over vlan2 and vlan3 in switch 1 and configure the IP addresses and priority.**

```
SEFOS# configure terminal
SEFOS(config)# router vrrp
SEFOS(config-vrrp)# interface vlan 2
SEFOS(config-vrrp-if)# vrrp 1 ipv4 12.0.0.3
SEFOS(config-vrrp-if)# vrrp 1 priority 150
SEFOS(config-vrrp-if)# exit
SEFOS(config-vrrp)# interface vlan 3
SEFOS(config-vrrp-if)# vrrp 1 ip 20.0.0.3
SEFOS(config-vrrp-if)# vrrp 1 priority 150
SEFOS(config-vrrp-if)# end
```

7. **Verify the VRRP configurations in switch 1.**

```
SEFOS# show  vrrp
P indicates configured to preempt
Interface   vrID Priority  P  State    Master Addr     VRouter Addr
---------   ---- --------  -  -----    -----------     ------------
vlan2       1    150       P  Master   local           12.0.0.3
vlan3       1    150       P  Master   local           20.0.0.3
```

8. **Enable VRRP instances over vlan 2 and vlan 3 in switch 2, and configure the IP addresses and priority.**

```
SEFOS# configure terminal
SEFOS(config)# router vrrp
SEFOS(config-vrrp)# interface vlan 2
SEFOS(config-vrrp-if)# vrrp 1 ipv4 12.0.0.3
SEFOS(config-vrrp-if)# vrrp 1 priority 125
SEFOS(config-vrrp-if)# exit
SEFOS(config-vrrp)# interface vlan 3
SEFOS(config-vrrp-if)# vrrp 1 ipv4 20.0.0.3
SEFOS(config-vrrp-if)# vrrp 1 priority 125
SEFOS(config-vrrp-if)# end
```

9. **Verify the VRRP configurations in switch 2.**

```
SEFOS# show  vrrp
P indicates configured to preempt
Interface   vrID Priority  P  State    Master Addr     VRouter Addr
---------   ---- --------  -  -----    -----------     ------------
vlan2       1    125       P  Backup   12.0.0.3        12.0.0.3
vlan3       1    125       P  Backup   20.0.0.3        20.0.0.3
```

10. **In host 1, configure an interface with** `12.0.0.100` **and add a route to the host 2 network through** `12.0.0.3`**.**

    a. **Execute these Linux commands in host 1 (a Linux machine is used as a host).**

```
[root@host1 root]# /sbin/ifconfig eth0 12.0.0.100
[root@host1 root]# /sbin/route add -net 20.0.0.0 netmask 255.0.0.0
gw 12.0.0.3
```

    b. **Verify the configurations using these Linux commands.**

```
[root@host1 root]# /sbin/ifconfig
eth0      Link encap:Ethernet  HWaddr 00:10:B5:66:A7:28
 inet addr:12.0.0.100  Bcast:12.255.255.255  Mask:255.0.0.0
[root@host1 root]# /sbin/route -nUP BROADCAST RUNNING MULTICAST
MTU:1500  Metric:1
Kernel IP routing table
Destination  Gateway    Genmask       Flags Metric Ref    Use Iface
12.0.0.0     0.0.0.0    255.0.0.0      U     0      0      0   eth0
20.0.0.0     12.0.0.3   255.0.0.0      UG    0      0      0   eth0
RX packets:35 errors:0 dropped:0 overruns:0 frame:0
TX packets:80 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:100
RX bytes:2974 (2.9 Kb)  TX bytes:6092 (5.9 Kb)
Interrupt:15 Base address:0xbd00
```

11. **In host 2, configure an interface with** `20.0.0.100` **and add a route to the host 1 network through** `20.0.0.3`**.**

    a. **Execute these Linux commands in host 2 (another Linux machine).**

```
[root@host2 root]# /sbin/ifconfig eth0 20.0.0.100
[root@host2 root]# /sbin/route add -net 12.0.0.0 netmask 255.0.0.0
gw 20.0.0.3
```

b. Verify the configurations using these Linux commands.

```
[root@host2 root]# /sbin/ifconfig
eth0      Link encap:Ethernet  HWaddr 00:10:B5:66:A7:28
 inet addr:20.0.0.100  Bcast:20.255.255.255  Mask:255.0.0.0
[root@host2 root]# /sbin/route -nUP BROADCAST RUNNING MULTICAST
MTU:1500  Metric:1
Kernel IP routing table
Destination  Gateway     Genmask     Flags Metric Ref    Use Iface
20.0.0.0    0.0.0.0    255.0.0.0      U     0     0        0     eth0
12.0.0.0   20.0.0.3    255.0.0.0     UG     0     0        0     eth0
RX packets:35 errors:0 dropped:0 overruns:0 frame:0
TX packets:80 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:100
RX bytes:2974 (2.9 Kb)  TX bytes:6092 (5.9 Kb)
Interrupt:15 Base address:0xbd00
```

12. Initiate 25 ping packets from host 1 to host 2.

```
[root@host2 root]# ping 20.0.0.100 -c 25
PING 20.0.0.100 (20.0.0.100) from 12.0.0.100 : 56(84) bytes of
data.
64 bytes from 20.0.0.100: icmp_seq=1 ttl=63 time=79.0 ms
64 bytes from 20.0.0.100: icmp_seq=2 ttl=63 time=25.4 ms
64 bytes from 20.0.0.100: icmp_seq=3 ttl=63 time=25.7 ms
```

13. During the ping session, shutdown vlan 2 and vlan 3 in switch 1.

```
SEFOS# configure terminal
SEFOS(config)# interface vlan 2
SEFOS(config-if)# shutdown
SEFOS(config-if )# exit
SEFOS(config)# interface vlan 3
SEFOS(config-if)# shutdown
SEFOS(config-if)# end
```

14. Observe whether the ping is still successful after a small black hole period (connectivity loss between the hosts).

```
64 bytes from 20.0.0.100: icmp_seq=4 ttl=63 time=27.6 ms
64 bytes from 20.0.0.100: icmp_seq=5 ttl=63 time=24.8 ms
64 bytes from 20.0.0.100: icmp_seq=13 ttl=63 time=49.7 ms
64 bytes from 20.0.0.100: icmp_seq=14 ttl=63 time=30.3 ms
64 bytes from 20.0.0.100: icmp_seq=15 ttl=63 time=24.3 ms
64 bytes from 20.0.0.100: icmp_seq=16 ttl=63 time=31.3 ms
```

```
64 bytes from 20.0.0.100: icmp_seq=17 ttl=63 time=25.9 ms
64 bytes from 20.0.0.100: icmp_seq=18 ttl=63 time=30.3 ms
64 bytes from 20.0.0.100: icmp_seq=19 ttl=63 time=33.7 ms
64 bytes from 20.0.0.100: icmp_seq=20 ttl=63 time=28.8 ms
64 bytes from 20.0.0.100: icmp_seq=21 ttl=63 time=22.9 ms
64 bytes from 20.0.0.100: icmp_seq=22 ttl=63 time=25.3 ms
64 bytes from 20.0.0.100: icmp_seq=23 ttl=63 time=30.0 ms
64 bytes from 20.0.0.100: icmp_seq=24 ttl=63 time=22.3 ms
64 bytes from 20.0.0.100: icmp_seq=25 ttl=63 time=26.5 ms

--- 20.0.0.100 ping statistics ---
25 packets transmitted, 18 received, 28% loss, time 24045ms
rtt min/avg/max/mdev = 22.342/31.370/79.070/13.006 ms
```

15. **Verify that the ARP table in host 1 for** `12.0.0.3` **is resolved with the VRRP MAC address.**

```
[root@host1 root]# /sbin/arp -an
? (12.0.0.3) at 00:00:5E:00:01:01 [ether] on eth0
```

16. **Verify that the ARP table in host 2 for** `20.0.0.3` **is resolved with the VRRP MAC address.**

```
[root@host2 root]# /sbin/arp -an
? (20.0.0.3) at 00:00:5E:00:01:01 [ether] on eth0
```

Alternatively, use the following steps to set up host 1 with a system running Solaris 10 and using an `nxge` 10GbE interface.

a. **Configure the interface with** `12.0.0.100` **as its IP address and add a route to the host 2 network through** `12.0.0.3`**.**

```
root@unknown:~# ifconfig nxge0 plumb 12.0.0.100 up
root@unknown:~# route add net 20.0.0.0/8 12.0.0.3
```

b. **Verify the configuration.**

```
root@unknown:~# ifconfig nxge0
nxge0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu
1500 index 6
 inet 12.0.0.100 netmask ff000000 broadcast 12.255.255.255
```

```
root@unknown:~# netstat -rnether 0:14:4f:9b:de:b2
Routing Table: IPv4
Destination           Gateway        Flags  Ref  Use    Interface
-----------           --------       -----  ---  ---    ---------
12.0.0.0              12.0.0.100     U      5    16     nxge0
20.0.0.0               12.0.0.3       UG     2    1343
127.0.0.1              127.0.0.1      UH     2    3100   lo0
```

c. Verify that the ARP entry for the gateway is the VRRP MAC address.

```
root@unknown:~# arp -an
Net to Media Table: IPv4
Device   IP Address  Mask               Flags    Phys Addr
------   ----------  ----               -----    ---------
nxge0    12.0.0.1    255.255.255.255            00:21:28:77:c3:bd
nxge0    12.0.0.2    255.255.255.255            00:14:4f:6c:d0:4d
nxge0    12.0.0.3    255.255.255.255            00:00:5e:00:01:01
nxge0    12.0.0.100  255.255.255.255   SPLA     00:14:4f:9b:de:b2
```