



# Configuring VRRP Aware PIM

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## VRRP Aware PIM

The Virtual Router Redundancy Protocol (VRRP) eliminates the single point of failure inherent in the static default routed environment. VRRP is an election protocol that dynamically assigns responsibility for one or more virtual routers to the VRRP routers on a LAN, allowing several routers on a multi access link to utilize the same virtual IP address.

VRRP Aware PIM is a redundancy mechanism for the Protocol Independent Multicast (PIM) to interoperate with VRRP. It allows PIM to track VRRP state and to preserve multicast traffic upon fail over in a redundant network with virtual routing groups enabled.

This module explains how to configure VRRP Aware PIM in a network.

## Restrictions for VRRP Aware PIM

- Only PIM sparse mode (SM) and source specific multicast (SSM) modes are supported. Bidirectional (BiDir) PIM is not supported.
- PIM interoperability with Hot Standby Router Protocol (HSRP) IPv6 is not supported.
- PIM tracks only one virtual group, either Virtual Router Redundancy Protocol (VRRP) or HSRP, per interface.
- VRRP Aware PIM is not supported on a Transit network. PIM redundancy enabled interface does not support the PIM joining the network from down stream.

## Information About VRRP Aware PIM

### Overview of VRRP Aware PIM

Virtual Router Redundancy Protocol (VRRP) is a redundancy protocol for establishing a fault-tolerant default gateway. The protocol establishes a framework between network devices in order to achieve default gateway failover if the primary gateway becomes inaccessible.

Protocol Independent Multicast (PIM) has no inherent redundancy capabilities and its operation is completely independent of VRRP group states. As a result, IP multicast traffic is forwarded not necessarily by the same

device as is elected by VRRP. The VRRP Aware PIM feature provides consistent IP multicast forwarding in a redundant network with virtual routing groups enabled.

In a multi-access segment (such as LAN), PIM designated router (DR) election is unaware of the redundancy configuration, and the elected DR and VRRP primary router (MR) may not be the same router. In order to ensure that the PIM DR is always able to forward PIM Join/Prune message towards RP or FHR, the VRRP MR becomes the PIM DR (if there is only one VRRP group). PIM is responsible for adjusting DR priority based on the group state. When a fail over occurs, multicast states are created on the new MR elected by the VRRP group and the MR assumes responsibility for the routing and forwarding of all the traffic addressed to the VRRP virtual IP address. This ensures the PIM DR runs on the same gateway as the VRRP MR and maintains mroute states. It enables multicast traffic to be forwarded through the VRRP MR, allowing PIM to leverage VRRP redundancy, avoid potential duplicate traffic, and enable fail over, depending on the VRRP states in the device.

Virtual Router Redundancy Service (VRRS) provides public APIs for a client to communicate with VRRP. VRRP Aware PIM is a feature of VRRS that supports VRRPv3 (unified VRRP) in both IPv4 and IPv6.

PIM, as a VRRS client, uses the VRRS client API to obtain generic First Hop Redundancy Protocol (FHRP) state and configuration information in order to provide multicast redundancy functionalities.

PIM performs the following as a VRRS client:

- Listens to state change and update notification from VRRS server (i.e., VRRP).
- Automatically adjust PIM DR priority based on VRRP state.
- Upon VRRP fail over, PIM receives state change notification from VRRS for the tracked VRRP group and ensures traffic is forwarded through VRRP MR.

## How to Configure VRRP Aware PIM

### Configuring VRRP Aware PIM

#### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **fhrp version vrrp *version***
4. **interface *type number***
5. **ip address *address* {*primary* |*secondary*}**
6. **vrrp *group id* address-family ipv4**
7. **vrrs leader *group name***
8. **vrrp *group id* ip *ip address* {*primary* |*secondary*}**
9. **exit**
10. **interface *type number***
11. **ip pim redundancy *group name* vrrp dr-priority *priority-value***
12. **end**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b> <b>Example:</b> Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b> <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>fhrp version vrrp version</b> <b>Example:</b> Device(config)# fhrp version vrrp v3	Enables the ability to configure VRRPv3 and VRRS.
Step 4	<b>interface type number</b> <b>Example:</b> Device(config)# interface Ethernet0/0	Specifies an interface to be configured and enters interface configuration mode.
Step 5	<b>ip address address {primary  secondary}</b> <b>Example:</b> Device(config-if)# ip address 192.0.2.2	Specifies a primary or secondary address for the VRRP group.
Step 6	<b>vrrp group id address-family ipv4</b> <b>Example:</b> Device(config-if)# vrrp 1 address-family ipv4	Creates a VRRP group and enters VRRP configuration mode.
Step 7	<b>vrrs leader group name</b> <b>Example:</b> Device(config-if-vrrp)# vrrs leader VRRP1	Enables community and (or) extended community exchange with the specified neighbor.
Step 8	<b>vrrp group id ip ip address {primary  secondary}</b> <b>Example:</b> Device(config-if-vrrp)# vrrp 1 ip 10.1.6.1	Exits address family configuration mode and returns to router configuration mode.
Step 9	<b>exit</b> <b>Example:</b> Device(config-if-vrrp)# exit	Exits VRRP configuration mode and returns to global configuration mode.

	Command or Action	Purpose
<b>Step 10</b>	<b>interface</b> <i>type number</i> <b>Example:</b> Device(config)# interface Ethernet0/0	Specifies an interface to be configured and enters interface configuration mode.
<b>Step 11</b>	<b>ip pim redundancy</b> <i>group name</i> <b>vrrp dr-priority</b> <i>priority-value</i> <b>Example:</b> Device(config-if)# ip pim redundancy VRRP1 vrrp dr-priority 90	sets the priority for which a router is elected as the designated router (DR). <ul style="list-style-type: none"> <li>The redundancy dr-priority value should be same on all routers that are enabled with VRRP Aware PIM feature.</li> </ul>
<b>Step 12</b>	<b>end</b> <b>Example:</b> Device(config-if)# end	Exits interface configuration mode and returns to privileged EXEC mode.

## Configuration Examples for VRRP Aware PIM

### Example: VRRP Aware PIM

```

conf terminal
  fhrp version vrrp v3
  interface Ethernet0/0
    ip address 192.0.2.2
    vrrp 1 address-family ipv4

    vrrp 1 ip 10.1.6.1

  vrrs leader VRRP1
  interface Ethernet0/0
    ip pim redundancy VRRP1 vrrp dr-priority 90
  !

```