



## VRRP Aware PIM

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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.

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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

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

|                | Command or Action  | Purpose   |
|----------------|--|---|
|                | Device(config-if-vrrp)# vrrs leader VRRP1  |   |
| <b>Step 8</b>  | <b>vrrp group id ip ip address {primary  secondary}</b><br><b>Example:</b><br>Device(config-if-vrrp)# vrrp 1 ip 10.1.6.1                                 | Exits address family configuration mode and returns to router configuration mode.   |
| <b>Step 9</b>  | <b>exit</b><br><b>Example:</b><br>Device(config-if-vrrp)# exit   | Exits VRRP configuration mode and returns to global configuration mode.   |
| <b>Step 10</b> | <b>interface type number</b><br><b>Example:</b><br>Device(config)# interface Ethernet0/0   | Specifies an interface to be configured and enters interface configuration mode.  |
| <b>Step 11</b> | <b>ip pim redundancy group name vrrp dr-priority priority-value</b><br><b>Example:</b><br>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><br><b>Example:</b><br>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
!
```

## Additional References for VRRP Aware PIM

### Related Documents

| Related Topic         | Document Title   |
|-----------------------|--|
| Cisco IOS commands    | <a href="#">Cisco IOS Master Commands List, All Releases</a> |
| IP multicast commands | <a href="#">Cisco IOS IP Multicast Command Reference</a>     |
| Configuring VRRP      | First Hop Redundancy Protocols Configuration Guide           |
| IP multicast PIM      | IP Multicast: PIM Configuration Guide                        |

### Technical Assistance

| Description   | Link  |
|---|---|
| The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password. | <a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a> |

## Feature Information for VRRP Aware PIM

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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*Table 1: Feature Information for VRRP Aware PIM*

| Feature Name   | Releases                   | Feature Information  |
|----------------|----------------------------|--|
| VRRP Aware PIM | Cisco IOS XE Release 3.10S | 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 failover in a redundant network with virtual routing groups enabled.<br><br>No commands were introduced or modified. |