This chapter describes how to configure ProCurve Routing Switches to configure the following router redundancy protocols:

- **VRRP Extended (VRRPE)** – An enhanced version of VRRP that overcomes limitations in the standard protocol.

**NOTE:** VRRP and VRRPE are separate protocols. You cannot use them together. Also, neither of these two protocols are compatible with XRRP, on the ProCurve series 5300 XL switches.

**NOTE:** You can use a ProCurve Routing Switch configured for VRRP with another ProCurve Routing Switch or a third-party router that is also configured for VRRP. However, you can use a ProCurve Routing Switch configured for VRRPE only with another ProCurve Routing Switch that also is configured for VRRPE.

For a summary of how these two router redundancy protocols differ, see “Comparison of VRRP and VRRPE” on page 16-7.

**Overview**

The following sections describe VRRP and VRRPE. The protocols both provide redundant paths for IP addresses. However, the protocols differ in a few important ways. For clarity, each protocol is described separately.

**Overview of VRRP**

VRRP is a protocol that provides redundancy to routers within a LAN. VRRP allows you to provide alternate router paths for a host without changing the IP address or MAC address by which the host knows its gateway. Consider the situation shown in Figure 16.1.
Figure 16.1  Router1 is Host1’s default gateway but is a single point of failure

As shown in this example, Host1 uses 192.53.5.1 on Router1 as the host’s default gateway out of the sub-net. If this interface goes down, Host1 is cut off from the rest of the network. Router1 is thus a single point of failure for Host1’s access to other networks.

If Router1 fails, you could configure Host1 to use Router2. Configuring one host with a different default gateway might not require too much extra administration. However, consider a more realistic network with dozens or even hundreds of hosts per sub-net; reconfiguring the default gateways for all the hosts is impractical. It is much simpler to configure a VRRP virtual router on Router1 and Router2 to provide a redundant path for the host(s).

Figure 16.2 shows the same example network shown in Figure 16.1, but with a VRRP virtual router configured on Router1 and Router2.
Figure 16.2  Router1 and Router2 are configured as a VRRP virtual router to provide redundant network access for Host1

The dashed box in Figure 16.2 represents a VRRP virtual router. When you configure a virtual router, one of the configuration parameters is the virtual router ID (VRID), which can be a number from 1 – 255. In this example, the VRID is 1.

NOTE: You can provide more redundancy by also configuring a second VRID with Router2 as the Owner and Router1 as the Backup. This type of configuration is sometimes called Multigroup VRRP.

Virtual Router ID (VRID)

A VRID consists of one Master router and one or more Backup routers. The Master router is the router that owns the IP address(es) you associate with the VRID. For this reason, the Master router is sometimes called the “Owner”. Configure the VRID on the router that owns the default gateway interface. The other router in the VRID does not own the IP address(es) associated with VRID but provides the backup path if the Master router becomes unavailable.

Virtual Router MAC Address

Notice the MAC address associated with VRID1. The first five octets of the address are the standard MAC prefix for VRRP packets, as described in RFC 2338. The last octet is the VRID. The VRID number becomes the final octet in the virtual MAC address associated with the virtual router.

When you configure a VRID, the software automatically assigns its MAC address. When a VRID becomes active, the Master router broadcasts a gratuitous ARP request containing the virtual router’s MAC address for each IP address associated with the virtual router. In Figure 16.2, Router1 sends a gratuitous ARP with MAC address 00-00-5e-00-01-01 and IP address 192.53.5.1. Hosts use the virtual router’s MAC address in routed traffic they send to their default IP gateway (in this example, 192.53.5.1).
Virtual Router IP Address

VRRP does not use virtual IP addresses. Thus, there is no virtual IP address associated with a virtual router. Instead, you associate the virtual router with one or more real interface IP addresses configured on the router that owns the real IP address(es). In Figure 16.2, the virtual router with VRID1 is associated with real IP address 192.53.5.1, which is configured on interface e1/6 on Router1. VRIDs are interface-level parameters, not system-level parameters, so the IP address you associate with the VRID must already be a real IP address configured on the Owner’s interface.

When you configure the Backup router for the VRID, specify the same IP address as the one you specify on the Owner. This is the IP address used by the host as its default gateway. The IP address cannot also exist on the Backup router. The interface on which you configure the VRID on the Backup router must have an IP address in the same sub-net.

**NOTE:** If you delete a real IP address used by a VRRP entry, the VRRP entry also is deleted automatically.

**NOTE:** When a Backup takes over forwarding responsibilities from a failed Master router, the Backup forwards traffic addressed to the VRID MAC address, which the host believes is the MAC address of the router interface for its default gateway. However, the Backup cannot reply to IP pings sent to the IP address(es) associated with the VRID. Because the IP address(es) are owned by the Owner, if the Owner is unavailable, the IP addresses are unavailable as packet destinations.

Master Negotiation

The routers within a VRID use the VRRP priority values associated with each router to determine which router becomes the Master. When you configure the VRID on a router interface, you specify whether the router is the Owner of the IP address(es) you plan to associate with the VRID or a Backup. If you indicate that the router is the Owner of the IP address(es), the software automatically sets the router’s VRRP priority for the VRID to 255, the highest VRRP priority. The router with the highest priority becomes the Master.

Backup routers can have a priority from 3 – 254, which you assign when you configure the VRID on the Backup router's interfaces. The default VRRP priority for Backup routers is 100.

Because the router that owns the IP addresses associated with the VRID always has the highest priority, when all the routers in the virtual router are operating normally, the negotiation process results in the Owner of the VRID's IP address(es) becoming the Master router. Thus, the VRRP negotiation results in the normal case, in which the hosts’ path to the default route is to the router that owns the interface for that route.

Hello Messages

VRRP routers use Hello messages for negotiation to determine the Master router. VRRP routers send Hello messages to IP Multicast address 224.0.0.18. The frequency with which the Master sends Hello messages is the Hello Interval. Only the Master sends Hello messages. However, a Backup uses the Hello interval you configure for the Backup if it becomes the Master.

The Backup routers wait for a period of time called the Dead Interval for a Hello message from the Master. If a Backup router does not receive a Hello message by the time the dead interval expires, the Backup router assumes that the Master router is dead and negotiates with the other Backups to select a new Master router. The Backup router with the highest priority becomes the new Master.

If the Owner becomes unavailable, but then comes back online, the Owner again becomes the Master router. The Owner becomes the Master router again because it has the highest priority. The Owner always becomes the Master again when the Owner comes back online.

**NOTE:** If you configure a track port on the Owner and the track port is down, the Owner’s priority is changed to the track priority. In this case, the Owner does not have a higher priority than the Backup that is acting as Master and the Owner therefore does not resume its position as Master. For more information about track ports, see “Track Ports and Track Priority” on page 16-5.

By default, if a Backup is acting as the Master, and the Master is still unavailable, another Backup can “preempt” the Backup that is acting as the Master. This can occur if the new Backup has a higher priority than the Backup.
who is acting as Master. You can disable this behavior if you want. When you disable preemption, a Backup router that has a higher priority than the router who is currently acting as Master does not preempt the new Master by initiating a new Master negotiation. See “Backup Preempt” on page 16-17.

NOTE: Regardless of the setting for the preempt parameter, the Owner always becomes the Master again when it comes back online.

Track Ports and Track Priority

The HP implementation of VRRP enhances the protocol by giving a VRRP router the capability to monitor the state of the interfaces on the other end of the route path through the router. For example, in Figure 16.2 on page 16-3, interface e1/6 on Router1 owns the IP address to which Host1 directs route traffic on its default gateway. The exit path for this traffic is through Router1’s e2/4 interface.

Suppose interface e2/4 goes down. Even if interface e1/6 is still up, Host1 is nonetheless cut off from other networks. In conventional VRRP, Router1 would continue to be the Master router despite the unavailability of the exit interface for the path the router is supporting. However, if you configure interface e1/6 to track the state of interface e2/4, if e2/4 goes down, interface e1/6 responds by changing Router1’s VRRP priority to the value of the track priority. In the configuration shown in Figure 16.2 on page 16-3, Router1’s priority changes from 255 to 20. One of the parameters contained in the Hello messages the Master router sends to its Backups is the Master router’s priority. If the track port feature results in a change in the Master router’s priority, the Backup routers quickly become aware of the change and initiate a negotiation for Master router.

In Figure 16.2 on page 16-3, the track priority results in Router1’s VRRP priority becoming lower than Router2’s VRRP priority. As a result, when Router2 learns that it now has a higher priority than Router1, Router2 initiates negotiation for Master router and becomes the new Master router, thus providing an open path for Host1’s traffic. To take advantage of the track port feature, make sure the track priorities are always lower than the VRRP priorities. The default track priority for the router that owns the VRID IP address(es) is 2. The default track priority for Backup routers is 1. If you change the track port priorities, make sure you assign a higher track priority to the Owner of the IP address(es) than the track priority you assign on the Backup routers.

Suppression of RIP Advertisements for Backed Up Interfaces

The HP implementation also enhances VRRP by allowing you to configure the protocol to suppress RIP advertisements for the backed up paths from Backup routers. Normally, a VRRP Backup router includes route information for the interface it is backing up in RIP advertisements. As a result, other routers receive multiple paths for the interface and might sometimes unsuccessfully use the path to the Backup rather than the path to the Master. If you enable the HP implementation of VRRP to suppress the VRRP Backup routers from advertising the backed up interface in RIP, other routers learn only the path to the Master router for the backed up interface.

Authentication

The HP implementation of VRRP can use simple passwords to authenticate VRRP packets. The VRRP authentication type is not a parameter specific to the VRID. Instead, VRRP uses the authentication type associated with the interfaces on which you define the VRID. For example, if you configure your router interfaces to use a simple password to authenticate traffic, VRRP uses the same simple password and VRRP packets that do not contain the password are dropped. If your interfaces do not use authentication, neither does VRRP.

NOTE: The MD5 authentication type is not supported for VRRP.

Independent Operation of VRRP alongside RIP, OSPF, and BGP4

VRRP operation is independent of the RIP, OSPF, and BGP4 protocols. Their operation is unaffected when VRRP is enabled on a RIP, OSPF, or BGP4 interface.

Dynamic VRRP Configuration

All VRRP global and interface parameters take effect immediately. You do not need to reset the system to place VRRP configuration parameters into effect.

Overview of VRRPE

VRRPE is similar to VRRP, but differs in the following respects:
• Owners and Backups
  • VRRP has an Owner and one or more Backups for each VRID. The Owner is the router on which the VRID's IP address is also configured as a real address. All the other routers supporting the VRID are Backups.
  • VRRPE does not use Owners. All routers are Backups for a given VRID. The router with the highest priority becomes Master. If there is a tie for highest priority, the router with the highest IP address becomes Master. The elected Master owns the virtual IP address and answers ping and ARP requests and so on.

• VRID’s IP address
  • VRRP requires that the VRID also be a real IP address configured on the VRID's interface on the Owner.
  • VRRPE requires only that the VRID be in the same sub-net as an interface configured on the VRID’s interface. In fact, VRRPE does not allow you to specify a real IP address configured on the interface as the VRID IP address.

• VRID’s MAC Address
  • VRRP source MAC is a virtual MAC address defined as 00-00-5E-00-01-<vrid>, where <vrid> is the VRID. The Master owns the Virtual MAC address.
  • VRRPE uses the interface’s actual MAC address as the source MAC address. The MAC address is 02-E0-52-<hash-value>-<vrid>, where <hash-value> is a two-octet hashed value for the IP address and <vrid> is the VRID.

• Hello packets
  • VRRP sends Hello messages to IP Multicast address 224.0.0.18.
  • VRRPE uses UDP to send Hello messages in IP multicast messages. The Hello packets use the interface’s actual MAC address and IP address as the source addresses. The destination MAC address is 01-00-5E-00-00-02, and the destination IP address is 224.0.0.2 (the well-known IP multicast address for “all routers”). Both the source and destination UDP port number is 8888. VRRP messages are encapsulated in the data portion of the packet.

• Track ports and track priority
  • VRRP changes the priority of the VRID to the track priority, which typically is lower than the VRID priority and lower than the VRID’s priorities configured on the Backups. For example, if the VRRP interface’s priority is 100 and a tracked interface with track priority 20 goes down, the software changes the VRRP interface’s priority to 20.
  • VRRPE reduces the priority of a VRRPE interface by the amount of a tracked interface’s priority if the tracked interface’s link goes down. For example, if the VRRPE interface’s priority is 200 and a tracked interface with track priority 20 goes down, the software changes the VRRPE interface’s priority to 180. If another tracked interface goes down, the software reduces the VRID’s priority again, by the amount of the tracked interface’s track priority.

The most important difference is that all VRRPE routers are Backups. There is no Owner router. VRRPE overcomes the limitations in standard VRRP by removing the Owner.

Figure 16.3 shows an example of a VRRPE configuration.
In this example, RouterA and RouterB use VRRP to load share as well as provide redundancy to the hosts. The load sharing is accomplished by creating two VRRP groups. Each group has its own virtual IP addresses. Half of the clients point to VRID 1’s virtual IP address as their default gateway and the other half point to VRID 2’s virtual IP address as their default gateway. This will enable some of the outbound Internet traffic to go through RouterA and the rest to go through RouterB.

RouterA is the master for VRID 1 (backup priority = 110) and RouterB is the backup for VRID 1 (backup priority = 100). RouterA and RouterB both track the uplinks to the Internet. If an uplink failure occurs on RouterA, its backup priority is decremented by 20 (track priority = 20), so that all traffic destined to the Internet is sent through RouterB instead.

Similarly, RouterB is the master for VRID 2 (backup priority = 110) and RouterA is the backup for VRID 2 (backup priority = 100). RouterA and RouterB are both tracking the uplinks to the Internet. If an uplink failure occurs on RouterB, its backup priority is decremented by 20 (track priority = 20), so that all traffic destined to the Internet is sent through RouterA instead.

**Comparison of VRRP and VRRPE**

This section compares HP’s router redundancy protocols.

**VRRP**

VRRP is a standards-based protocol, described in RFC 2338. The HP implementation of VRRP contains the features in RFC 2338. The HP implementation also provides the following additional features:
• Track ports – An HP feature that enables you to diagnose the health of all the Routing Switch’s ports used by
the backed-up VRID, instead of only the port connected to the client sub-net. See “Track Ports and Track
Priority” on page 16-5.

• Suppression of RIP advertisements on Backup routes for the backed up interface – You can enable the
Routing Switches to advertise only the path to the Master router for the backed up interface. Normally, a
VRRP Backup router includes route information for the interface it is backing up in RIP advertisements.

ProCurve Routing Switches configured for VRRP can interoperate with third-party routers using VRRP.

VRRPE
VRRPE is an HP protocol that provides the benefits of VRRP without the limitations. VRRPE is unlike VRRP in
the following ways:

• There is no “Owner” router. You do not need to use an IP address configured on one of the Routing Switches
as the virtual router ID (VRID), which is the address you are backing up for redundancy. The VRID is
independent of the IP interfaces configured in the Routing Switches. As a result, the protocol does not have
an “Owner” as VRRP does.

• There is no restriction on which router can be the default master router. In VRRP, the “Owner” (the Routing
Switch on which the IP interface that is used for the VRID is configured) must be the default Master.

ProCurve Routing Switches configured for VRRPE can interoperate only with other ProCurve Routing Switches.

Architectural Differences
The protocols have the following architectural differences.

Management Protocol

• VRRP – VRRP routers send VRRP Hello and Hello messages to IP Multicast address 224.0.0.18.

• VRRPE – VRRPE sends messages to destination MAC address 01-00-5E-00-00-02 and destination IP
address 224.0.0.2 (the standard IP multicast address for “all routers”).

Virtual Router IP Address (the address you are backing up)

• VRRP – The virtual router IP address is the same as an IP address or virtual interface configured on one of
the Routing Switches, which is the “Owner” and becomes the default Master.

• VRRPE – The virtual router IP address is the gateway address you want to backup, but does not need to be
an IP interface configured on one of the Routing Switch's ports or a virtual interface.

Master and Backups

• VRRP – The “Owner” of the IP address of the VRID is the default Master and has the highest priority (255).
The precedence of the Backups is determined by their priorities. The default Master is always the Owner of
the IP address of the VRID.

• VRRPE – The Master and Backups are selected based on their priority. You can configure any of the Routing
Switches to be the Master by giving it the highest priority. There is no Owner.

NOTE: Hewlett-Packard recommends that you do not use more than one redundancy protocol on the same
device.
VRRP and VRRPE Parameters

Table 16.1 lists the VRRP and VRRPE parameters. Most of the parameters and default values are the same for both protocols. The exceptions are noted in the table.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default</th>
<th>See page...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>The Virtual Router Redundancy Protocol (VRRP) based on RFC 2338 or VRRP-Extended, HP's enhanced implementation of VRRP</td>
<td>Disabled</td>
<td>16-11, 16-12</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Only one of the protocols can be enabled at a time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VRRP or VRRPE router</td>
<td>The ProCurve Routing Switch’s active participation as a VRRP or VRRPE router. Enabling the protocol does not activate the Routing Switch for VRRP or VRRPE. You must activate the device as a VRRP or VRRPE router after you configure the VRRP or VRRPE parameters.</td>
<td>Inactive</td>
<td>16-11, 16-12</td>
</tr>
<tr>
<td>Virtual Router ID (VRID)</td>
<td>The ID of the virtual router you are creating by configuring multiple routers to back up an IP interface. You must configure the same VRID on each router that you want to use to back up the address. No default.</td>
<td>None</td>
<td>16-3, 16-11, 16-12</td>
</tr>
<tr>
<td>Virtual Router IP address</td>
<td>This is the address you are backing up. No default.</td>
<td>None</td>
<td>16-4, 16-11, 16-12</td>
</tr>
<tr>
<td></td>
<td>• VRRP – The virtual router IP address must be a real IP address configured on the VRID interface on one of the VRRP routers. This router is the IP address Owner and is the default Master.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• VRRPE – The virtual router IP address must be in the same sub-net as a real IP address configured on the VRRPE interface, but cannot be the same as a real IP address configured on the interface.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VRID MAC address</td>
<td>The source MAC address in VRRP or VRRPE packets sent from the VRID interface, and the destination for packets sent to the VRID.</td>
<td>Not configurable</td>
<td>16-3</td>
</tr>
<tr>
<td></td>
<td>• VRRP – A virtual MAC address defined as 00-00-5e-00-01--vrid&gt;. The Master owns the Virtual MAC address.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• VRRPE – A virtual MAC address defined as 02-e0-52&lt;hash-value&gt;-&lt;vrid&gt;, where &lt;hash-value&gt; is a two-octet hashed value for the IP address and &lt;vrid&gt; is the VRID.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Default</td>
<td>See page...</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Authentication type</td>
<td>The type of authentication the VRRP or VRRPE routers use to validate VRRP or VRRPE packets. The authentication type must match the authentication type the VRID’s port uses with other routing protocols such as OSPF.</td>
<td>No authentication</td>
<td>16-5 16-13</td>
</tr>
<tr>
<td>Authentication type</td>
<td>• No authentication – The interfaces do not use authentication. This is the VRRP default.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authentication type</td>
<td>• Simple – The interface uses a simple text-string as a password in packets sent on the interface. If the interface uses simple password authentication, the VRID configured on the interface must use the same authentication type and the same password.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authentication type</td>
<td><strong>Note:</strong> MD5 is not supported by VRRP or VRRPE.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Router type</td>
<td>Whether the router is an Owner or a Backup.</td>
<td>VRRP – The Owner is always the router that has the real IP address used by the VRID. All other routers for the VRID are Backups. VRRPE – All routers for the VRID are Backups.</td>
<td>16-14</td>
</tr>
<tr>
<td>Router type</td>
<td>• Owner (VRRP only) – The router on which the real IP address used by the VRID is configured.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Router type</td>
<td>• Backup – Routers that can provide routing services for the VRID but do not have a real IP address matching the VRID.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup priority</td>
<td>A numeric value that determines a Backup’s preferability for becoming the Master for the VRID. During negotiation, the router with the highest priority becomes the Master.</td>
<td>VRRP – 255 for the Owner; 100 for each Backup VRRPE – 100 for all Backups</td>
<td>16-14</td>
</tr>
<tr>
<td>Backup priority</td>
<td>• VRRP – The Owner has the highest priority (255); other routers can have a priority from 3 – 254.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup priority</td>
<td>• VRRPE – All routers are Backups and have the same priority by default. If two or more Backups are tied with the highest priority, the Backup interface with the highest IP address becomes the Master for the VRID.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suppression of RIP</td>
<td>A router that is running RIP normally advertises routes to a backed up VRID even when the router is not currently the active router for the VRID. Suppression of these advertisements helps ensure that other routers do not receive invalid route paths for the VRID.</td>
<td>Disabled</td>
<td>16-15</td>
</tr>
<tr>
<td>advertisements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hello interval</td>
<td>The number of seconds between Hello messages from the Master to the Backups for a given VRID. The interval can from 1 – 84 seconds.</td>
<td>One second</td>
<td>16-4 16-16</td>
</tr>
</tbody>
</table>
Table 16.1: VRRP and VRRPE Parameters (Continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default</th>
<th>See page...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead interval</td>
<td>The number of seconds a Backup waits for a Hello message from the Master for the VRID before determining that the Master is no longer active. If the Master does not send a Hello message before the dead interval expires, the Backups negotiate (compare priorities) to select a new Master for the VRID.</td>
<td>Three times the Hello Interval plus one-half second</td>
<td>16-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16-16</td>
</tr>
<tr>
<td>Backup Hello interval</td>
<td>The number of seconds between Hello messages from a Backup to the Master. The message interval can be from 60 – 3600 seconds. You must enable the Backup to send the messages. The messages are disabled by default on Backups. The current Master (whether the VRRP Owner or a Backup) sends Hello messages by default.</td>
<td>Disabled 60 seconds when enabled</td>
<td>16-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16-16</td>
</tr>
<tr>
<td>Track port</td>
<td>Another Routing Switch port or virtual interface whose link status is tracked by the VRID’s interface. If the link for a tracked interface goes down, the VRRP or VRRPE priority of the VRID interface is changed, causing the devices to renegotiate for Master.</td>
<td>None</td>
<td>16-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16-17</td>
</tr>
<tr>
<td>Track priority</td>
<td>A VRRP or VRRPE priority value assigned to the tracked port(s). If a tracked port's link goes down, the VRID port's VRRP or VRRPE priority changes. • VRRP – The priority changes to the value of the tracked port's priority. • VRRPE – The VRID port's priority is reduced by the amount of the tracked port’s priority.</td>
<td>VRRP – 2</td>
<td>16-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16-17</td>
</tr>
<tr>
<td>Backup preempt mode</td>
<td>Prevents a Backup with a higher VRRP priority from taking control of the VRID from another Backup that has a lower priority but has already assumed control of the VRID.</td>
<td>Enabled</td>
<td>16-17</td>
</tr>
</tbody>
</table>

Configuring Basic VRRP Parameters

To implement a simple VRRP configuration using all the default values, enter commands such as the following.

**Configuring the Owner**

```
Router1(config)# router vrrp
Router1(config)# inter e 1/6
Router1(config-if-1/6)# ip address 192.53.5.1
Router1(config-if-1/6)# ip vrrp vrid 1
Router1(config-if-1/6-vrid-1)# owner
Router1(config-if-1/6-vrid-1)# ip-address 192.53.5.1
Router1(config-if-1/6-vrid-1)# activate
```
**Configuring a Backup**

Router2(config)# router vrrp
Router2(config)# inter e 1/5
Router2(config-if-1/5)# ip address 192.53.5.3
Router2(config-if-1/5)# ip vrrp vrid 1
Router2(config-if-1/5-vrid-1)# backup
Router2(config-if-1/5-vrid-1)# ip-address 192.53.5.1
Router2(config-if-1/5-vrid-1)# activate

**Configuration Rules for VRRP**

- The interfaces of all routers in a VRID must be in the same IP sub-net.
- The IP address(es) associated with the VRID must already be configured on the router that will be the Owner router.
- An IP address(es) associated with the VRID must be on only one router.
- The Hello interval must be set to the same value on both the Owner and Backup(s) for the VRID.
- The Dead interval must be set to the same value on both the Owner and Backup(s) for the VRID.
- The track priority on a router must be lower than the router’s VRRP priority. Also, the track priority on the Owner must be higher than the track priority on the Backup(s).

**Configuring Basic VRRPE Parameters**

To implement a simple VRRPE configuration using all the default values, enter commands such as the following on each Routing Switch.

Router2(config)# router vrrp-extended
Router2(config)# inter e 1/5
Router2(config-if-1/5)# ip address 192.53.5.3
Router2(config-if-1/5)# ip vrrp-extended vrid 1
Router2(config-if-1/5-vrid-1)# backup
Router2(config-if-1/5-vrid-1)# ip-address 192.53.5.254
Router2(config-if-1/5-vrid-1)# activate

**NOTE:** You also can use the **enable** command to activate the configuration. This command does the same thing as the **activate** command.

**Configuration Rules for VRRPE**

- The interfaces of all routers in a VRID must be in the same IP sub-net.
- The IP address(es) associated with the VRID cannot be configured on any of the Routing Switches.
- The Hello interval must be set to the same value on all the Routing Switches.
- The Dead interval must be set to the same value on all the Routing Switches.
- The track priority for a VRID must be lower than the VRRPE priority.

**Note Regarding Disabling VRRP or VRRPE**

If you disable VRRP or VRRPE, the Routing Switch removes all the configuration information for the disabled protocol from the running-config. Moreover, when you save the configuration to the startup-config file after disabling one of these protocols, all the configuration information for the disabled protocol is removed from the startup-config file.

The CLI displays a warning message such as the following:
ProCurveRS(config-vrrp-router)# no router vrrp
router vrrp mode now disabled. All vrrp config data will be lost when writing to flash!

The Web management interface does not display a warning message.

If you have disabled the protocol but have not yet saved the configuration to the startup-config file and reloaded the software, you can restore the configuration information by re-entering the command to enable the protocol (ex: `router vrrp`), or by selecting the Web management option to enable the protocol. If you have already saved the configuration to the startup-config file and reloaded the software, the information is gone.

If you are testing a VRRP or VRRPE configuration and are likely to disable and re-enable the protocol, you might want to make a backup copy of the startup-config file containing the protocol's configuration information. This way, if you remove the configuration information by saving the configuration after disabling the protocol, you can restore the configuration by copying the backup copy of the startup-config file onto the flash memory.

### Configuring Additional VRRP and VRRPE Parameters

You can modify the following VRRP and VRRPE parameters on an individual VRID basis. These parameters apply to both protocols:

- **Authentication type** (if the interfaces on which you configure the VRID use authentication)
- **Router type** (Owner or Backup)

**NOTE:** For VRRP, change the router type only if you have moved the real IP address from one router to another or you accidentally configured the IP address Owner as a Backup.

For VRRPE, the router type is always Backup. You cannot change the type to Owner.

- **Backup priority**
- **Suppression of RIP advertisements on Backup routes for the backed up interface**
- **Hello interval**
- **Dead interval**
- **Backup Hello messages and message timer (Backup advertisement)**
- **Track port**
- **Track priority**
- **Backup preempt mode**

For VRRP, you can set some of these parameters using the VRRP configuration panel of the Web management interface, shown in on page 16-44. For information about the fields, see the parameter descriptions in the following sections. To access this panel, select VRRP from the System configuration sheet, then click Modify next to the VRRP entry you want to edit.

**NOTE:** You cannot set VRRPE parameters using the Web management interface.

See “VRRP and VRRPE Parameters” on page 16-9 for a summary of the parameters and their defaults.

### Authentication Type

If the interfaces on which you configure the VRID use authentication, the VRRP or VRRPE packets on those interfaces also must use the same authentication. HP's implementation of VRRP and VRRPE supports the following authentication types:

- **No authentication** – The interfaces do not use authentication. This is the default for VRRP and VRRPE.
- **Simple** – The interfaces use a simple text-string as a password in packets sent on the interface. If the interfaces use simple password authentication, the VRID configured on the interfaces must use the same
authentication type and the same password.

**USING THE CLI**

To configure the VRID interface on Router1 for simple-password authentication using the password “ourpword”, enter the following commands:

**Configuring Router 1**

Router1(config)# inter e 1/6
Router1(config-if-1/6)# ip vrrp auth-type simple-text-auth ourpword

**Configuring Router 2**

Router2(config)# inter e 1/5
Router2(config-if-1/5)# ip vrrp auth-type simple-text-auth ourpword

**VRRP Syntax**

Syntax: ip vrrp auth-type no-auth | simple-text-auth <auth-data>

The **auth-type no-auth** parameter indicates that the VRID and the interface it is configured on do not use authentication.

The **auth-type simple-text-auth <auth-data>** parameter indicates that the VRID and the interface it is configured on use a simple text password for authentication. The <auth-data> parameter is the password. If you use this parameter, make sure all interfaces on all the routers supporting this VRID are configured for simple password authentication and use the same password.

**VRRPE Syntax**

Syntax: ip vrrp-extended auth-type no-auth | simple-text-auth <auth-data>

The parameter values are the same as for VRRP.

**Router Type**

A VRRP interface is either an Owner or a Backup for a given VRID. By default, the Owner becomes the Master following the negotiation. A Backup becomes the Master only if the Master becomes unavailable.

A VRRPE interface is always a Backup for its VRID. The Backup with the highest VRRP priority becomes the Master.

This section describes how to specify the interface type, how to change the type for VRRP, and how to set or change the interface’s VRRP or VRRPE priority and track priority for the VRID.

**NOTE:** You can force a VRRP master router to abdicate (give away control) of the VRID to a Backup by temporarily changing the Master’s VRRP priority to a value less than the Backup’s. See “Forcing a Master Router To Abdicate to a Standby Router” on page 16-18.

**NOTE:** The type Owner is not applicable to VRRPE.
NOTE: The IP address(es) you associate with the Owner must be a real IP address (or addresses) on the interface on which you configure the VRID.

When you configure a Backup router, the router interface on which you are configuring the VRID must have a real IP address that is in the same sub-net as the address associated with the VRID by the Owner. However, the address cannot be the same.

USING THE CLI
To configure Router1 as a VRRP VRID’s Owner, enter the following commands:

Router1(config)# inter e 1/6
Router1(config-if-1/6)# ip vrrp vrid 1
Router1(config-if-1/6-vrid-1)# owner

To configure Router2 as a VRRP Backup for the same VRID, enter the following commands:

Router2(config)# inter e 1/5
Router2(config-if-1/5)# ip vrrp vrid 1
Router2(config-if-1/5-vrid-1)# backup

To configure a VRRPE interface as a Backup for a VRID and set its VRRPE priority and track priority, enter commands such as the following:

ProCurveRS(config)# inter e 1/1
ProCurveRS(config-if-1/1)# ip vrrp-extended vrid 1
ProCurveRS(config-if-1/1-vrid-1)# backup priority 50 track-priority 10

**VRRP Syntax**

*Syntax:* owner [track-priority <value>]

The **track-priority** <value> parameter changes the track-port priority for this interface and VRID from the default (2) to a value from 1 – 254.

*Syntax:* backup [priority <value>] [track-priority <value>]

The **priority** <value> parameter specifies the VRRP priority for this interface and VRID. You can specify a value from 3 – 254. The default is 100.

The **track-priority** <value> parameter is the same as above.

NOTE: You cannot set the priority of a VRRP Owner. The Owner’s priority is always 255.

**VRRPE Syntax**

*Syntax:* backup [priority <value>] [track-priority <value>]

The software requires you to identify a VRRPE interface as a Backup for its VRID before you can activate the interface for the VRID. However, after you configure the VRID, you can use this command to change its priority or track priority. The parameter values are the same as for VRRP.

**Suppression of RIP Advertisements on Backup Routers for the Backup Up Interface**

Normally, a VRRP or VRRPE Backup includes route information for the virtual IP address (the backed up interface) in RIP advertisements. As a result, other routers receive multiple paths for the backed up interface and might sometimes unsuccessfully use the path to the Backup rather than the path to the Master.

You can prevent the Backups from advertising route information for the backed up interface by enabling suppression of the advertisements.

**USING THE CLI**

To suppress RIP advertisements for the backed up interface in Router2, enter the following commands:

Router2(config)# router rip
Router2(config-rip-router)# use-vrrp-path
**Syntax:** use-vrrp-path

The syntax is the same for VRRP and VRRPE.

**Hello Interval**

The Master periodically sends Hello messages to the Backups. The Backups use the Hello messages as verification that the Master is still on-line. If the Backup routers stop receiving the Hello messages for the period of time specified by the Dead interval, the Backup routers determine that the Master router is dead. At this point, the Backup router with the highest priority becomes the new Master router. The Hello interval can be from 1 – 84 seconds. The default is 1 second.

**NOTE:** The default Dead interval is three times the Hello Interval plus one-half second. Generally, if you change the Hello interval, you also should change the Dead interval on the Backup routers.

**USING THE CLI**

To change the Hello interval on the Master to 10 seconds, enter the following commands:

```bash
Router1(config)# int e 1/6
Router1(config-if-1/6)# ip vrrp vrid 1
Router1(config-if-1/6-vrid-1)# hello-interval 10
```

**Syntax:** hello-interval <value>

The syntax is the same for VRRP and VRRPE.

**Dead Interval**

The Dead interval is the number of seconds a Backup waits for a Hello message from the Master before determining that the Master is dead. When Backups determine that the Master is dead, the Backup with the highest priority becomes the new Master. The Dead interval can be from 1 – 84 seconds. The default is 3.5 seconds. This is three times the default Hello interval (1 second) plus one-half second added by the router software. The software automatically adds one-half second to the Dead interval value you enter.

**USING THE CLI**

To change the Dead interval on a Backup to 30 seconds, enter the following commands:

```bash
Router2(config)# int e 1/5
Router2(config-if-1/5)# ip vrrp vrid 1
Router2(config-if-1/5-vrid-1)# dead-interval 30
```

**Syntax:** dead-interval <value>

The syntax is the same for VRRP and VRRPE.

**Backup Hello Message State and Interval**

By default, Backup do not send Hello messages to advertise themselves to the Master. You can enable these messages if desired and also change the message interval.

**USING THE CLI**

To enable a Backup to send Hello messages to the Master, enter commands such as the following:

```bash
ProCurveRS(config)# router vrrp
ProCurveRS(config)# int e 1/6
ProCurveRS(config-if-1/6)# ip vrrp vrid 1
ProCurveRS(config-if-1/6-vrid-1)# advertise backup
```

**Syntax:** [no] advertise backup
When you enable a Backup to send Hello messages, the Backup sends a Hello messages to the Master every 60 seconds by default. You can change the interval to be up to 3600 seconds. To do so, enter commands such as the following:

```
ProCurveRS(config)# router vrrp
ProCurveRS(config)# int e 1/6
ProCurveRS(config-if-1/6)# ip vrrp vrid 1
ProCurveRS(config-if-1/6-vrid-1)# backup-hello-interval 180
```

**Syntax:** `no backup-hello-interval <num>`

The `<num>` parameter specifies the message interval and can be from 60 – 3600 seconds. The default is 60 seconds.

The syntax is the same for VRRP and VRRPE.

**Track Port**

You can configure the VRID on one interface to track the link state of another interface on the Routing Switch. This capability is quite useful for tracking the state of the exit interface for the path for which the VRID is providing redundancy. See “Track Ports and Track Priority” on page 16-5.

**USING THE CLI**

To configure 1/6 on Router1 to track interface 2/4, enter the following commands:

```
Router1(config)# int e 1/6
Router1(config-if-1/6)# ip vrrp vrid 1
Router1(config-if-1/6-vrid-1)# track-port e 2/4
```

**Syntax:** `track-port ethernet <portnum> | ve <num>`

The syntax is the same for VRRP and VRRPE.

**Track Priority**

When you configure a VRID to track the link state of other interfaces, if one of the tracked interface goes down, the software changes the VRRP or VRRPE priority of the VRID interface.

- For VRRP, the software changes the priority of the VRID to the track priority, which typically is lower than the VRID priority and lower than the VRID's priorities configured on the Backups. For example, if the VRRPE interface's priority is 100 and a tracked interface with track priority 60 goes down, the software changes the VRRPE interface's priority to 60.

- For VRRPE, the software reduces the VRID priority by the amount of the priority of the tracked interface that went down. For example, if the VRRPE interface's priority is 100 and a tracked interface with track priority 60 goes down, the software changes the VRRPE interface's priority to 40. If another tracked interface goes down, the software reduces the VRID's priority again, by the amount of the tracked interface's track priority.

The default track priority for a VRRP Owner is 2. The default track priority for Backups is 1.

You enter the track priority as a parameter with the `owner` or `backup` command. See “Track Port” on page 16-17.

**Syntax:** `owner [track-priority <value>]`

**Syntax:** `backup [priority <value>] [track-priority <value>]`

The syntax is the same for VRRP and VRRPE.

**Backup Preempt**

By default, a Backup that has a higher priority than another Backup that has become the Master can preempt the Master, and take over the role of Master. If you want to prevent this behavior, disable preemption.

Preemption applies only to Backups and takes effect only when the Master has failed and a Backup has assumed ownership of the VRID. The feature prevents a Backup with a higher priority from taking over as Master from another Backup that has a lower priority but has already become the Master of the VRID.
Preemption is especially useful for preventing flapping in situations where there are multiple Backups and a Backup with a lower priority than another Backup has assumed ownership, because the Backup with the higher priority was unavailable when ownership changed.

If you enable the non-preempt mode (thus disabling the preemption feature) on all the Backups, the Backup that becomes the Master following the disappearance of the Master continues to be the Master. The new Master is not preempted.

**NOTE:** In VRRP, regardless of the setting for the preempt parameter, the Owner always becomes the Master again when it comes back online.

**USING THE CLI**

To disable preemption on a Backup, enter commands such as the following:

```
Router1(config)# int e 1/6
Router1(config-if-1/6)# ip vrrp vrid 1
Router1(config-if-1/6-vrid-1)# non-preempt-mode
```

**Syntax:** non-preempt-mode

The syntax is the same for VRRP and VRRPE.

### Forcing a Master Router To Abdicate to a Standby Router

You can force a VRRP Master to abdicate (give away control) of a VRID to a Backup by temporarily changing the Master's priority to a value less than the Backup's.

The VRRP Owner always has priority 255. You can even use this feature to temporarily change the Owner's priority to a value from 1 – 254.

**NOTE:** When you change a VRRP Owner's priority, the change takes effect only for the current power cycle. The change is not saved to the startup-config file when you save the configuration and is not retained across a reload or reboot. Following a reload or reboot, the VRRP Owner again has priority 255.

To temporarily change the Master's priority, use the following CLI method.

**USING THE CLI**

To change the Master's priority, enter commands such as the following:

```
ProCurveRS(config)# ip int eth 1/6
ProCurveRS(config-if-1/6)# ip vrrp vrid 1
ProCurveRS(config-if-1/6-vrid-1)# owner priority 99
```

**Syntax:** [no] owner priority | track-priority <num>

The `<num>` parameter specifies the new priority and can be a number from 1 – 254.

When you press Enter, the software changes the priority of the Master to the specified priority. If the new priority is lower than at least one Backup's priority for the same VRID, the Backup takes over and becomes the new Master until the next software reload or system reset.

To verify the change, enter the following command from any level of the CLI:

```
ProCurveRS(config-if-1/6-vrid-1)# show ip vrrp
Total number of VRRP routers defined: 1
Interface ethernet 1/6
auth-type no authentication
VRID 1
state backup
administrative-status enabled
mode owner
priority 99
```

---

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Configuring VRRP and VRRPE

**current priority 99**
hello-interval 1 sec
ip-address 192.53.5.1
backup routers 192.53.5.2

This example shows that even though this Routing Switch is the Owner of the VRID ("mode owner"), the Routing Switch's priority for the VRID is only 99 and the state is now "backup" instead of "active". In addition, the administrative status is "enabled".

To change the Master's priority back to the default Owner priority 255, enter "no" followed by the command you entered to change the priority. For example, to change the priority of a VRRP Owner back to 255 from 99, enter the following command:

```
ProCurveRS(config-if-1/6-vrid-1)# no owner priority 99
```

You cannot set the priority to 255 using the `owner priority` command.

**USING THE WEB MANAGEMENT INTERFACE**

You cannot change the Master router's priority using the Web management interface.

### Displaying VRRP and VRRPE Information

You can display the following information for VRRP or VRRPE:

- Summary configuration and status information
- Detailed configuration and status information
- VRRP and VRRPE Statistics
- CPU utilization statistics

**NOTE:** You cannot display VRRPE information using the Web management interface.

#### Displaying Summary Information

To display summary VRRP or VRRPE information, use the following CLI method.

**USING THE CLI**

To display summary information for a Routing Switch, enter the following command at any level of the CLI:

```
ProCurveRS(config-if-e1000-1/6-vrid-1)# show ip vrrp brief
```

Total number of VRRP routers defined: 1
Interface VRID CurPri P State  Master addr  Backup addr       VIP
1/6   1  255 P Init  192.53.5.1  192.53.5.3 192.53.5.1

This example is for VRRP. Here is an example for VRRPE:

```
ProCurveRS(config-if-e1000-1/6-vrid-1)# show ip vrrp-extended brief
```

Total number of VRRP-Extended routers defined: 1
Interface VRID CurPri P State  Master addr  Backup addr       VIP
1/6   1  255 P Init  192.53.5.2  192.53.5.3 192.53.5.254

**Syntax:** show ip vrrp brief | ethernet <portnum> | ve <num> | stat

**Syntax:** show ip vrrp-extended brief | ethernet <portnum> | ve <num> | stat

The `brief` parameter displays the summary information. If you do not use this parameter, detailed information is displayed instead. See "Displaying Detailed Information" on page 16-21.
The `ethernet <portnum>` parameter specifies an Ethernet port. If you use this parameter, the command displays VRRP or VRRPE information only for the specified port.

The `ve <num>` parameter specifies a virtual interface. If you use this parameter, the command displays VRRP or VRRPE information only for the specified virtual interface.


This display shows the following information.

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of VRRP (or VRRP-Extended) routers defined</td>
<td>The total number of VRIDs configured on this Routing Switch. <strong>Note:</strong> The total applies only to the protocol the Routing Switch is running. For example, if the Routing Switch is running VRRPE, the total applies only to VRRPE routers.</td>
</tr>
<tr>
<td>Interface</td>
<td>The interface on which VRRP or VRRPE is configured. If VRRP or VRRPE is configured on multiple interfaces, information for each interface is listed separately.</td>
</tr>
<tr>
<td>VRID</td>
<td>The VRID configured on this interface. If multiple VRIDs are configured on the interface, information for each VRID is listed in a separate row.</td>
</tr>
<tr>
<td>CurPri</td>
<td>The current VRRP or VRRPE priority of this Routing Switch for the VRID.</td>
</tr>
<tr>
<td>P</td>
<td>Whether the backup preempt mode is enabled. If the backup preempt mode is enabled, this field contains a “P”. If the mode is disabled, this field is blank.</td>
</tr>
</tbody>
</table>
| State | This Routing Switch’s VRRP or VRRPE state for the VRID. The state can be one of the following:  
- **Init** – The VRID is not enabled (activated). If the state remains Init after you activate the VRID, make sure that the VRID is also configured on the other routers and that the routers can communicate with each other. **Note:** If the state is Init and the mode is incomplete, make sure you have specified the IP address for the VRID.  
- **Backup** – This Routing Switch is a Backup for the VRID.  
- **Master** – This Routing Switch is the Master for the VRID. |
| Master addr | The IP address of the router interface that is currently the Master for the VRID. |
| Backup addr | The IP addresses of the router interfaces that are currently Backups for the VRID. |
| VIP | The virtual IP address that is being backed up by the VRID. |
**Configuring VRRP and VRRPE**

**USING THE WEB MANAGEMENT INTERFACE**
You cannot display the summary view using the Web management interface. Use the Web management procedure in “Displaying Detailed Information”.

**Displaying Detailed Information**
To display detailed VRRP or VRRPE information, use either of the following methods.

**USING THE CLI**
To display detailed information, enter the following command at any level of the CLI:

```
ProCurveRS(config)# show ip vrrp
```

Total number of VRRP routers defined: 1
Interface ethernet 1/6
  auth-type no authentication
  VRID 1
    state master
    administrative-status enabled
    mode owner
    priority 255
    current priority 255
    hello-interval 1 sec
    advertise backup: disabled
    track-port 2/4

This example is for a VRRP Owner. Here is an example for a VRRP Backup.

```
ProCurveRS(config)# show ip vrrp
```

Total number of VRRP routers defined: 1
Interface ethernet 1/5
  auth-type no authentication
  VRID 1
    state backup
    administrative-status enabled
    mode non-owner(backup)
    priority 100
    current priority 100
    hello-interval 1 sec
    dead-interval 3.600 sec
    current dead-interval 3.600 sec
    preempt-mode true
    advertise backup: enabled
    backup router 192.53.5.3 expires in 00:00:03
    next hello sent in 00:00:02
    track-port 3/2
Here is an example for a VRRPE Backup.

ProCurveRS(config)# show ip vrrp-extended

Total number of VRRP-Extended routers defined: 1
Interface ethernet 1/6
    auth-type no authentication
    VRID 1
        state master
        administrative-status enabled
        priority 200
        current priority 200
        hello-interval 1 sec
        dead-interval 3.600 sec
        current dead-interval 3.600 sec
        preempt-mode true
        virtual ip address 192.53.5.254
        advertise backup: enabled
        master router 192.53.5.2 expires in 00:00:03
        track-port 2/4

Syntax: show ip vrrp brief | ethernet <portnum> | ve <num> | stat
Syntax: show ip vrrp-extended brief | ethernet <portnum> | ve <num> | stat

The brief parameter displays summary information. See “Displaying Summary Information” on page 16-19.

The ethernet <portnum> parameter specifies an Ethernet port. If you use this parameter, the command displays VRRP or VRRPE information only for the specified port.

The ve <num> parameter specifies a virtual interface. If you use this parameter, the command displays VRRP or VRRPE information only for the specified virtual interface.


This display shows the following information.

Table 16.3: CLI Display of VRRP or VRRPE Detailed Information

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
</table>
| Total number of VRRP (or VRRP-Extended) routers defined | The total number of VRIDs configured on this Routing Switch.  
  Note: The total applies only to the protocol the Routing Switch is running. For example, if the Routing Switch is running VRRPE, the total applies only to VRRPE routers. |
| Interface parameters                  |                                                                             |
| Interface                              | The interface on which VRRP or VRRPE is configured. If VRRP or VRRPE is configured on multiple interfaces, information for each interface is listed separately. |
| auth-type                              | The authentication type enabled on the interface.                          |
| VRID parameters                        |                                                                             |
| VRID                                   | The VRID configured on this interface. If multiple VRIDs are configured on the interface, information for each VRID is listed separately. |

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Table 16.3: CLI Display of VRRP or VRRPE Detailed Information (Continued)

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>state</td>
<td>This Routing Switch’s VRRP or VRRPE state for the VRID. The state can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>• initialize – The VRID is not enabled (activated). If the state remains “initialize” after you activate the VRID, make sure that the VRID is also configured on the other routers and that the routers can communicate with each other.</td>
</tr>
<tr>
<td></td>
<td>\ Note: If the state is “initialize” and the mode is incomplete, make sure you have specified the IP address for the VRID.</td>
</tr>
<tr>
<td></td>
<td>• backup – This Routing Switch is a Backup for the VRID.</td>
</tr>
<tr>
<td></td>
<td>• master – This Routing Switch is the Master for the VRID.</td>
</tr>
<tr>
<td>administrative-status</td>
<td>The administrative status of the VRID. The administrative status can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>• disabled – The VRID is configured on the interface but VRRP or VRRPE has not been activated on the interface.</td>
</tr>
<tr>
<td></td>
<td>• enabled – VRRP or VRRPE has been activated on the interface.</td>
</tr>
<tr>
<td>mode</td>
<td>Indicates whether the Routing Switch is the Owner or a Backup for the VRID.</td>
</tr>
<tr>
<td></td>
<td>\ Note: If “incomplete” appears after the mode, configuration for this VRID is incomplete. For example, you might not have configured the virtual IP address that is being backup up by the VRID.</td>
</tr>
<tr>
<td></td>
<td>\ Note: This field applies only to VRRP. All Routing Switches configured for VRRPE are Backups.</td>
</tr>
<tr>
<td>priority</td>
<td>The device’s preferability for becoming the Master for the VRID. During negotiation, the router with the highest priority becomes the Master.</td>
</tr>
<tr>
<td></td>
<td>If two or more devices are tied with the highest priority, the Backup interface with the highest IP address becomes the active router for the VRID.</td>
</tr>
<tr>
<td>current priority</td>
<td>The current VRRP or VRRPE priority of this Routing Switch for the VRID. The current priority can differ from the configured priority (see the row above) for the following reasons:</td>
</tr>
<tr>
<td></td>
<td>• The VRID is still in the initialization stage and has not become a Master or Backup yet. In this case, the current priority is 0.</td>
</tr>
<tr>
<td></td>
<td>• The VRID is configured with track ports and the link on a tracked interface has gone down. See “Track Ports and Track Priority” on page 16-5.</td>
</tr>
<tr>
<td>hello-interval</td>
<td>The number of seconds between Hello messages from the Master to the Backups for a given VRID.</td>
</tr>
<tr>
<td>This Field...</td>
<td>Displays...</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| dead-interval              | The configured value for the dead interval. The dead interval is the number of seconds a Backup waits for a Hello message from the Master for the VRID before determining that the Master is no longer active.  
If the Master does not send a Hello message before the dead interval expires, the Backups negotiate (compare priorities) to select a new Master for the VRID.  
**Note:** If the value is 0, then you have not configured this parameter.  
**Note:** This field does not apply to VRRP Owners.                                                                                                                                                                                      |
| current dead-interval      | The current value of the dead interval. This is the value actually in use by this interface for the VRID.                                                                                                                                                                                             |
|                            | **Note:** This field does not apply to VRRP Owners.                                                                                                                                                                                                                                               |
| preempt-mode               | Whether the backup preempt mode is enabled.                                                                                                                                                                                                                                                           |
|                            | **Note:** This field does not apply to VRRP Owners.                                                                                                                                                                                                                                               |
| virtual ip address         | The virtual IP addresses that this VRID is backing up.                                                                                                                                                                                                                                            |
| advertise backup           | The IP addresses of Backups that have advertised themselves to this Routing Switch by sending Hello messages.                                                                                                                                                                                           |
|                            | **Note:** Hello messages from Backups are disabled by default. You must enable the Hello messages on the Backup for the Backup to advertise itself to the current Master. See “Hello Messages” on page 16-4.                                                                                                                                             |
| backup router <ip-addr> expires in <time> | The IP addresses of Backups that have advertised themselves to this Master by sending Hello messages.                                                                                                                                                     
The <time> value indicates how long before the Backup expires. A Backup expires if you disable the advertise backup option on the Backup or the Backup becomes unavailable. Otherwise, the Backup’s next Hello message arrives before the Backup expires. The Hello message resets the expiration timer.  
An expired Backup does not necessarily affect the Master. However, if you have not disabled the advertise backup option on the Backup, then the expiration may indicate a problem with the Backup.  
**Note:** This field applies only when Hello messages are enabled on the Backups (using the advertise backup option).                                                                                                                                 |
| next hello sent in <time>  | How long until the Backup sends its next Hello message.                                                                                                                                                                                                                                            |
|                            | **Note:** This field applies only when this Routing Switch is the Master and the Backup is configured to send Hello messages (the advertise backup option is enabled).                                                                                                                                 |
| master router <ip-addr> expires in <time> | The IP address of the Master and the amount of time until the Master’s dead interval expires. If the Backup does not receive a Hello message from the Master by the time the interval expires, either the IP address listed for the Master will change to the IP address of the new Master, or this Routing Switch itself will become the Master.  
**Note:** This field applies only when this Routing Switch is a Backup.                                                                                                                                                               |
### Table 16.3: CLI Display of VRRP or VRRPE Detailed Information (Continued)

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>track port</td>
<td>The interfaces that the VRID’s interface is tracking. If the link for a tracked interface goes down, the VRRP or VRRPE priority of the VRID interface is changed, causing the devices to renegotiate for Master. <strong>Note:</strong> This field is displayed only if track interfaces are configured for this VRID.</td>
</tr>
</tbody>
</table>

### USING THE WEB MANAGEMENT INTERFACE

**NOTE:** This procedure applies only to VRRP. You cannot display VRRPE information using the Web management interface.

1. Log on to the device using a valid user name and password for read-only or read-write access. The System configuration dialog is displayed.
2. Click on the plus sign next to Monitor in the tree view to display the monitoring options.
3. Click on the plus sign next to VRRP in the tree view to expand the list of VRRP option links.
4. Click on the Interface link to display the virtual router table.
5. Click on the Virtual Router link to display the virtual router table.

**NOTE:** If a parameter is not defined or does not apply to this type of entry, the field is blank. For example, if the entry is for a VRRP Owner, the Backup Priority field does not apply and is blank.

This display shows the following information.

### Table 16.4: Web Display of VRRP Detailed Information

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interface table</strong></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>The interface number. All the device’s interfaces are listed.</td>
</tr>
<tr>
<td>Authentication Type</td>
<td>The authentication type enabled on the interface.</td>
</tr>
<tr>
<td>Simple Text Password</td>
<td>If the authentication type is simple password, this field lists the password.</td>
</tr>
<tr>
<td><strong>Virtual Router table</strong></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>The interface number. All the device’s interfaces are listed.</td>
</tr>
<tr>
<td>ID</td>
<td>The VRID configured on this interface. If multiple VRIDs are configured on the interface, information for each VRID is listed separately.</td>
</tr>
<tr>
<td>Hello Intv</td>
<td>The number of seconds between Hello messages from the Master to the Backups for a given VRID.</td>
</tr>
<tr>
<td>Activate</td>
<td>Indicates whether this VRID is activated. After configuring the VRID, you must activate it. The VRID is disabled by default.</td>
</tr>
</tbody>
</table>
### Table 16.4: Web Display of VRRP Detailed Information (Continued)

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP List</td>
<td>The IP addresses that this VRID is backing up.</td>
</tr>
<tr>
<td>Mode</td>
<td>Indicates whether the Routing Switch is the Owner or a Backup for the VRID.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> The mode applies only to VRRP. All Routing Switches configured for VRRPE are Backups.</td>
</tr>
<tr>
<td>Backup – Priority</td>
<td>The device’s preferability for becoming the Master for the VRID. During negotiation, the router with the highest priority becomes the Master. If two or more devices are tied with the highest priority, the Backup interface with the highest IP address becomes the active router for the VRID.</td>
</tr>
<tr>
<td>Backup – Dead Intv</td>
<td>The number of seconds a Backup waits for a Hello message from the Master for the VRID before determining that the Master is no longer active. If the Master does not send a Hello message before the dead interval expires, the Backups negotiate (compare priorities) to select a new Master for the VRID.</td>
</tr>
<tr>
<td>Backup – Preempt</td>
<td>The state of the Backup preempt mode. The Backup preempt mode prevents a Backup with a higher VRRP priority from taking control of the VRID from another Backup that has a lower priority but has already assumed control of the VRID.</td>
</tr>
<tr>
<td>Track – Priority</td>
<td>A VRRP priority value assigned to the tracked port(s). If a tracked port's link goes down, the VRID port's priority is reduced by the amount of the tracked port's priority.</td>
</tr>
<tr>
<td>Track – Vif List</td>
<td>The virtual interfaces that the VRID’s interface is tracking. If the link for a tracked interface goes down, the VRRP priority of the VRID interface is changed, causing the devices to renegotiate for Master.</td>
</tr>
<tr>
<td>Track – Port List</td>
<td>The physical ports that the VRID’s interface is tracking. If the link for a tracked port goes down, the VRRP priority of the VRID interface is changed, causing the devices to renegotiate for Master.</td>
</tr>
</tbody>
</table>
Displaying Detailed Information for an Individual VRID

You can display information about the settings configured for a specified VRRP Virtual Router ID (VRID). For example, to display information about VRID 1:

ProCurveRS(config)# show ip vrrp vrid 1
VRID 1
  Interface ethernet 3/11
  state initialize
  administrative-status disabled
  mode non-owner(backup)incomplete
  priority 12
  current priority 12
  track-priority 22
  hello-interval 1 sec
  dead-interval 0 sec
  current dead-interval 3.900 sec
  preempt-mode true
  advertise backup: disabled

Syntax: show ip vrrp vrid <num> [ethernet <num> | ve <num>]

The <num> parameter specifies the VRID.

The ethernet <num> | ve <num> specifies an interface on which the VRID is configured. If you specify an interface, VRID information is displayed for that interface only. Otherwise, information is displayed for all the interfaces on which the specified VRID is configured.

This display shows the following information.

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>VRID</td>
<td>The specified VRID.</td>
</tr>
<tr>
<td>Interface</td>
<td>The interface on which VRRP is configured.</td>
</tr>
<tr>
<td>State</td>
<td>This Routing Switch’s VRRP state for the VRID.</td>
</tr>
<tr>
<td></td>
<td>The state can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>- Init – The VRID is not enabled (activated). If</td>
</tr>
<tr>
<td></td>
<td>the state remains Init after you activate the</td>
</tr>
<tr>
<td></td>
<td>VRID, make sure that the VRID is also configured</td>
</tr>
<tr>
<td></td>
<td>on the other routers and that the routers can</td>
</tr>
<tr>
<td></td>
<td>communicate with each other.</td>
</tr>
<tr>
<td></td>
<td>Note: If the state is Init and the mode is</td>
</tr>
<tr>
<td></td>
<td>incomplete, make sure you have specified the IP</td>
</tr>
<tr>
<td></td>
<td>address for the VRID.</td>
</tr>
<tr>
<td></td>
<td>- Backup – This Routing Switch is a Backup for</td>
</tr>
<tr>
<td></td>
<td>the VRID.</td>
</tr>
<tr>
<td></td>
<td>- Master – This Routing Switch is the Master for</td>
</tr>
<tr>
<td></td>
<td>the VRID.</td>
</tr>
<tr>
<td>priority</td>
<td>The configured VRRP priority of this Routing</td>
</tr>
<tr>
<td></td>
<td>Switch for the VRID.</td>
</tr>
<tr>
<td>current priority</td>
<td>The current VRRP priority of this Routing Switch</td>
</tr>
<tr>
<td></td>
<td>for the VRID.</td>
</tr>
<tr>
<td>track-priority</td>
<td>The new VRRP priority that the router receives</td>
</tr>
<tr>
<td></td>
<td>for this VRID if the interface goes down</td>
</tr>
<tr>
<td>hello-interval</td>
<td>How often the Master router sends Hello messages</td>
</tr>
<tr>
<td></td>
<td>to the Backups.</td>
</tr>
</tbody>
</table>

June 2005
Table 16.5: Output from the `show ip vrrp vrid` command (Continued)

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>dead-interval</td>
<td>The configured number of seconds a Backup waits for a Hello message from the Master before determining that the Master is dead.</td>
</tr>
<tr>
<td>current dead-interval</td>
<td>The current Dead interval. The software automatically adds one-half second to the Dead interval value you enter.</td>
</tr>
<tr>
<td>preempt-mode</td>
<td>Whether the backup preempt mode is enabled. If the backup preempt mode is enabled, this field contains “true”. If the mode is disabled, this field contains “false”.</td>
</tr>
<tr>
<td>advertise backup</td>
<td>Whether Backup routers send Hello messages to the Master.</td>
</tr>
</tbody>
</table>

### Displaying Statistics

To display VRRP or VRRPE statistics, use either of the following methods.

**USING THE CLI**

To display statistics, enter a command such as the following at any level of the CLI:

```
ProCurveRS(config-if-e1000-1/5-vrid-1)# show ip vrrp stat
```

```
Interface ethernet 1/5
  rxed vrrp header error count = 0
  rxed vrrp auth error count = 0
  rxed vrrp auth passwd mismatch error count = 0
  rxed vrrp vrid not found error count = 0
  VRID 1
  rxed arp packet drop count = 0
  rxed ip packet drop count = 0
  rxed vrrp port mismatch count = 0
  rxed vrrp ip address mismatch count = 0
  rxed vrrp hello interval mismatch count = 0
  rxed vrrp priority zero from master count = 0
  rxed vrrp higher priority count = 0
  transitioned to master state count = 1
  transitioned to backup state count = 1
```

The same statistics are listed for VRRP and VRRPE.

**Syntax:** `show ip vrrp brief | ethernet <portnum> | ve <num> | stat`

**Syntax:** `show ip vrrp-extended brief | ethernet <portnum> | ve <num> | stat`

The `brief` parameter displays summary information. See “Displaying Summary Information” on page 16-19.

The `ethernet <portnum>` parameter specifies an Ethernet port. If you use this parameter, the command displays detailed VRRP or VRRPE information only for the specified port. See “Displaying Detailed Information” on page 16-21.

The `ve <num>` parameter specifies a virtual interface. If you use this parameter, the command displays detailed VRRP or VRRPE information only for the specified virtual interface. See “Displaying Detailed Information” on page 16-21.

The `stat` parameter displays statistics. This parameter is required for displaying the statistics.
This display shows the following information.

### Table 16.6: CLI Display of VRRP or VRRPE Statistics

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interface Statistics</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>The interface on which VRRP or VRRPE is configured. If VRRP or VRRPE is configured on more than one interface, the display lists the statistics separately for each interface.</td>
</tr>
<tr>
<td>rxed vrrp header error count</td>
<td>The number of VRRP or VRRPE packets received by the interface that had a header error.</td>
</tr>
<tr>
<td>rxed vrrp auth error count</td>
<td>The number of VRRP or VRRPE packets received by the interface that had an authentication error.</td>
</tr>
<tr>
<td>rxed vrrp auth passwd mismatch error count</td>
<td>The number of VRRP or VRRPE packets received by the interface that had a password value that does not match the password used by the interface for authentication.</td>
</tr>
<tr>
<td>rxed vrrp vrid not found error count</td>
<td>The number of VRRP or VRRPE packets received by the interface that contained a VRID that is not configured on this interface.</td>
</tr>
<tr>
<td><strong>VRID Statistics</strong></td>
<td></td>
</tr>
<tr>
<td>rxed arp packet drop count</td>
<td>The number of ARP packets addressed to the VRID that were dropped.</td>
</tr>
<tr>
<td>rxed ip packet drop count</td>
<td>The number of IP packets addressed to the VRID that were dropped.</td>
</tr>
<tr>
<td>rxed vrrp port mismatch count</td>
<td>The number of packets received that did not match the configuration for the receiving interface.</td>
</tr>
<tr>
<td>rxed vrrp ip address mismatch count</td>
<td>The number of packets received that did not match the configured IP addresses.</td>
</tr>
<tr>
<td>rxed vrrp hello interval mismatch count</td>
<td>The number of packets received that did not match the configured Hello interval.</td>
</tr>
<tr>
<td>rxed vrrp priority zero from master count</td>
<td>The current Master has resigned.</td>
</tr>
<tr>
<td>rxed vrrp higher priority count</td>
<td>The number of VRRP or VRRPE packets received by the interface that had a higher backup priority for the VRID than this Routing Switch's backup priority for the VRID.</td>
</tr>
<tr>
<td>transitioned to master state count</td>
<td>The number of times this Routing Switch has changed from the backup state to the master state for the VRID.</td>
</tr>
<tr>
<td>transitioned to backup state count</td>
<td>The number of times this Routing Switch has changed from the master state to the backup state for the VRID.</td>
</tr>
</tbody>
</table>

### USING THE WEB MANAGEMENT INTERFACE

**NOTE:** This procedure applies only to VRRP. You cannot display VRRPE information using the Web management interface.

1. Log on to the device using a valid user name and password for read-only or read-write access. The System configuration dialog is displayed.
2. Click on the plus sign next to Monitor in the tree view to display the monitoring options.
3. Click on the plus sign next to VRRP in the tree view to expand the list of VRRP option links.
4. Click on the Virtual Router link to display the virtual router table or the Interface link to display the VRRP Interface table. The VRRP Interface table shows a row for each interface on the Routing Switch.

**NOTE:** If a parameter is not defined or does not apply to this type of entry, the field is blank. For example, if the entry is for a VRRP Owner, the Backup Priority field does not apply and is blank.

**NOTE:** It is possible for the statistics display for a Backup to show “Master” in the state field even when you have not yet configured another VRRP or VRRPE router. When you activate a Backup, if the Backup’s Dead interval expires before the Backup hears from another VRRP or VRRPE router, the Backup becomes the Master.

This display shows the following information.

**Table 16.7: Web Display of VRRP Statistics**

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Virtual Router panel</strong></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>The interface on which VRRP is configured. If VRRP is configured on more than one interface, the display lists the statistics separately for each interface.</td>
</tr>
<tr>
<td>Header Error</td>
<td>The number of VRRP packets received by the interface that had a header error.</td>
</tr>
<tr>
<td>Authen Type Error</td>
<td>The number of VRRP packets received by the interface that had an authentication error.</td>
</tr>
<tr>
<td>Authen Password Mismatch Error</td>
<td>The number of VRRP packets received by the interface that had a password value that does not match the password used by the interface for authentication.</td>
</tr>
<tr>
<td>Virtual Router ID Error</td>
<td>The number of VRRP packets received by the interface that contained a VRID that is not configured on this interface.</td>
</tr>
<tr>
<td><strong>Interface Statistics panel</strong></td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>The interface on which VRRP is configured. If VRRP is configured on more than one interface, the display lists the statistics separately for each interface.</td>
</tr>
<tr>
<td>ID</td>
<td>The VRID.</td>
</tr>
<tr>
<td>State</td>
<td>This Routing Switch’s VRRP state for the VRID. The state can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>• Init – The VRID is not enabled (activated). If the state remains Init after you activate the VRID, make sure that the VRID is also configured on the other routers and that the routers can communicate with each other.</td>
</tr>
<tr>
<td></td>
<td>Note: If the state is Init and the mode is incomplete, make sure you have specified the IP address for the VRID.</td>
</tr>
<tr>
<td></td>
<td>• Backup – This Routing Switch is a Backup for the VRID.</td>
</tr>
<tr>
<td></td>
<td>• Master – This Routing Switch is the Master for the VRID.</td>
</tr>
</tbody>
</table>
Table 16.7: Web Display of VRRP Statistics (Continued)

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive Pkts Drop – ARP</td>
<td>The number of ARP packets addressed to the VRID that were dropped.</td>
</tr>
<tr>
<td>Receive Pkts Drop – IP</td>
<td>The number of IP packets addressed to the VRID that were dropped.</td>
</tr>
<tr>
<td>Receive Mismatch – Port</td>
<td>The number of packets received that did not match the configuration for the receiving interface.</td>
</tr>
<tr>
<td>Receive Mismatch – Num of IP</td>
<td>The number of packets received that did not match the configured IP addresses.</td>
</tr>
<tr>
<td>Receive Mismatch – IP</td>
<td>The number of packets received that did not match the configured Hello interval.</td>
</tr>
<tr>
<td>Receive Mismatch – Hello</td>
<td>The current Master has resigned.</td>
</tr>
<tr>
<td>Rcv Priority Zero from Master</td>
<td>The number of packets received that did not match the configuration for the receiving interface.</td>
</tr>
<tr>
<td>Rcv Higher Priority</td>
<td>The number of VRRP packets received by the interface that had a higher backup priority for the VRID than this Routing Switch's backup priority for the VRID.</td>
</tr>
<tr>
<td>Transmit Count – Master</td>
<td>The number of times this Routing Switch has changed from the backup state to the master state for the VRID.</td>
</tr>
<tr>
<td>Transmit Count – Backup</td>
<td>The number of times this Routing Switch has changed from the master state to the backup state for the VRID.</td>
</tr>
</tbody>
</table>

**Clearing VRRP or VRRPE Statistics**

Use the following methods to clear VRRP or VRRPE statistics.

**USING THE CLI**

To clear VRRP or VRRPE statistics, enter the following command at the Privileged EXEC level or any configuration level of the CLI:

Router1(config)# clear ip vrrp-stat

*Syntax:* clear ip vrrp-stat

**USING THE WEB MANAGEMENT INTERFACE**

**NOTE:** This procedure applies only to VRRP. You cannot display VRRPE information using the Web management interface.

1. Log on to the device using a valid user name and password for read-write access. The System configuration dialog is displayed.
2. Click on the plus sign next to Command in the tree view to expand the list of command options.
3. Click on the Clear link to display the Clear panel.
4. Select VRRP.
5. Click the Apply button to implement the change.
**Displaying CPU Utilization Statistics**

You can display CPU utilization statistics for VRRP and other IP protocols.

**USING THE CLI**

To display CPU utilization statistics for the previous one-second, one-minute, five-minute, and fifteen-minute intervals, enter the following command at any level of the CLI:

```
ProCurveRS# show process cpu
```

<table>
<thead>
<tr>
<th>Process Name</th>
<th>5Sec(%)</th>
<th>1Min(%)</th>
<th>5Min(%)</th>
<th>15Min(%)</th>
<th>Runtime(ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARP</td>
<td>0.01</td>
<td>0.03</td>
<td>0.09</td>
<td>0.22</td>
<td>9</td>
</tr>
<tr>
<td>BGP</td>
<td>0.04</td>
<td>0.06</td>
<td>0.08</td>
<td>0.14</td>
<td>13</td>
</tr>
<tr>
<td>GVRP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>ICMP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>IP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>OSPF</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>RIP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>STP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>VRRP</td>
<td>0.07</td>
<td>0.09</td>
<td>0.10</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

If the software has been running less than 15 minutes (the maximum interval for utilization statistics), the command indicates how long the software has been running. Here is an example:

```
ProCurveRS# show process cpu
The system has only been up for 6 seconds.
Process Name  5Sec(%)  1Min(%)  5Min(%)  15Min(%)  Runtime(ms)
ARP  0.01  0.00  0.00 0.00  0           |
BGP  0.00  0.00  0.00 0.00  0           |
GVRP 0.00  0.00  0.00 0.00  0           |
ICMP 0.01  0.00  0.00 0.00  1           |
IP  0.00  0.00  0.00 0.00  0           |
OSPF 0.00  0.00  0.00 0.00  0           |
RIP  0.00  0.00  0.00 0.00  0           |
STP  0.00  0.00  0.00 0.00  0           |
VRRP 0.00  0.00  0.00 0.00  0           |
```

To display utilization statistics for a specific number of seconds, enter a command such as the following:

```
ProCurveRS# show process cpu 2
Statistics for last 1 sec and 80 ms
Process Name Sec(%) Time(ms)
ARP  0.00  0
BGP  0.00  0
GVRP 0.00  0
ICMP 0.01  1
IP  0.00  0
OSPF 0.00  0
RIP  0.00  0
STP  0.01  0
VRRP 0.00  0
```

When you specify how many seconds’ worth of statistics you want to display, the software selects the sample that most closely matches the number of seconds you specified. In this example, statistics are requested for the previous two seconds. The closest sample available is actually for the previous 1 second plus 80 milliseconds.

**Syntax:** `show process cpu [<num>]`
Configuring VRRP and VRRPE

The <num> parameter specifies the number of seconds and can be from 1 – 900. If you use this parameter, the command lists the usage statistics only for the specified number of seconds. If you do not use this parameter, the command lists the usage statistics for the previous one-second, one-minute, five-minute, and fifteen-minute intervals.

**USING THE WEB MANAGEMENT INTERFACE**

You cannot display this information using the Web management interface.

**Configuration Examples**

The following sections contain the CLI commands and Web management options for implementing the VRRP and VRRPE configurations shown in Figure 16.2 on page 16-3 and Figure 16.3 on page 16-7.

**VRRP Example**

To implement the VRRP configuration shown in Figure 16.2 on page 16-3, use either of the following methods.

**USING THE CLI**

**Configuring Router1 Using the CLI**

To configure VRRP Router1, enter the following commands:

```
Router1(config)# router vrrp
Router1(config)# inter e 1/6
Router1(config-if-1/6)# ip address 192.53.5.1
Router1(config-if-1/6)# ip vrrp vrid 1
Router1(config-if-1/6-vrid-1)# owner track-priority 20
Router1(config-if-1/6-vrid-1)# track-port ethernet 2/4
Router1(config-if-1/6-vrid-1)# ip-address 192.53.5.1
Router1(config-if-1/6-vrid-1)# activate
```

**NOTE:** When you configure the Master (Owner), the address you enter with the `ip-address` command must already be configured on the interface.

The `ip vrrp owner` command specifies that this router owns the IP address you are associating with the VRID. Because this router owns the IP address, this router is the default Master router and its VRRP priority is thus 255.

**Configuring Router2 Using the CLI**

To configure Router2 in Figure 16.2 on page 16-3 after enabling VRRP, enter the following commands:

```
Router2(config)# router vrrp
Router2(config)# inter e 1/5
Router2(config-if-1/5)# ip address 192.53.5.3
Router2(config-if-1/5)# ip vrrp vrid 1
Router2(config-if-1/5-vrid-1)# backup priority 100 track-priority 19
Router2(config-if-1/5-vrid-1)# track-port ethernet 3/2
Router2(config-if-1/5-vrid-1)# ip-address 192.53.5.1
Router2(config-if-1/5-vrid-1)# activate
```

The `backup` command specifies that this router is a VRRP Backup for virtual router VRID1. The IP address entered with the `ip-address` command is the same IP address as the one entered when configuring Router1. In this case, the IP address cannot also exist on Router2, but the interface on which you are configuring the VRID Backup must have an IP address in the same sub-net. By entering the same IP address as the one associated with this VRID on the Owner, you are configuring the Backup to back up the address, but you are not duplicating the address.
NOTE: When you configure a Backup router, the router interface on which you are configuring the VRID must have a real IP address that is in the same sub-net as the address associated with the VRID by the Owner. However, the address cannot be the same.

The **priority** parameter establishes the router's VRRP priority in relation to the other VRRP router(s) in this virtual router. The **track-priority** parameter specifies the new VRRP priority that the router receives for this VRID if the interface goes down. See “Track Ports and Track Priority” on page 16-5.

The **activate** command activates the VRID configuration on this interface. The interface does not provide backup service for the virtual IP address until you activate the VRRP configuration.

**Syntax:**

```plaintext
router vrrp
```

**Syntax:**

```plaintext
ip vrrp vrid <vrid>
```

**Syntax:**

```plaintext
owner [track-priority <value>]
```

**Syntax:**

```plaintext
backup [priority <value>] [track-priority <value>]
```

**Syntax:**

```plaintext
track-port ethernet <portnum> | ve <num>
```

**Syntax:**

```plaintext
ip-address <ip-addr>
```

**Syntax:**

```plaintext
activate
```

**USING THE WEB MANAGEMENT INTERFACE**

Use the following procedures to create a virtual router using the Web management interface.

NOTE: Some of the data entry fields contain zeros. When you save a VRRP definition, the software uses the default values for the parameters instead of zeros. The Web management interface shows zeros instead of the defaults because the defaults differ depending on whether you are creating an Owner or a Backup. The software does not know which type of VRID entry you are creating until you select Add to add the entry.

**Configuring Router1 Using the Web Management Interface**

To configure VRRP Router1 in Figure 16.2 on page 16-3 after you enable VRRP:

1. Log on to the device using a valid user name and password for read-write access. The System configuration dialog is displayed.

2. Click on the plus sign next to Configure in the tree view to expand the list of configuration options.

3. Click on the plus sign next to VRRP in the tree view to expand the list of VRRP option links.

4. Click on the **Virtual Router** link.
   - If the device does not have a VRRP virtual router configured, the VRRP configuration panel is displayed, as shown in the following example.
   - If a VRRP virtual router is already configured and you are adding a new one, click on the **Add Virtual Router** link to display the VRRP configuration panel, as shown in the following example.
   - If you are modifying an existing VRRP virtual router, click on the **Modify** button to the right of the row describing the VRRP virtual router to display the VRRP configuration panel, as shown in the following example.
5. Select the interface from the pulldown list on the Port field. In this example, select 1/6.
6. Enter the VRID in the Router ID field the Router ID field. In this example, use the default value, 1.
7. Enter the Hello interval or leave the field unchanged to use the default. The software fills in the default after you select Add. In this example, leave the field unchanged.
8. Select Enable to activate the VRRP entry after you select Add.
9. Enter the interface’s IP address in the IP Address List field. In this example, enter 192.53.5.1.
10. Select the mode (Owner or Backup). Select Owner in this example.
11. Enter the track priority or leave the field blank to use the default. In this example, enter 20.
12. Enter or select the track interface or port:
   • If you want to use a virtual interface as a track port, enter the virtual interface name.
   • If you want to use a physical interface as a track port, select the port. In this example, select 2/4.
13. Click the Add button to apply the changes to the device’s running-config.
14. Select the **Save** link at the bottom of the dialog, then select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.

**Configuring Router2 Using the Web Management Interface**

To configure VRRP Router2 in Figure 16.2 on page 16-3 after you enable VRRP:

1. Log on to the device using a valid user name and password for read-write access. The System configuration dialog is displayed.
2. Click on the plus sign next to Configure in the tree view to expand the list of configuration options.
3. Click on the plus sign next to VRRP in the tree view to expand the list of VRRP option links.
4. Click on the Virtual Router link.
   - If the device does not have a VRRP virtual router configured, the VRRP configuration panel is displayed.
   - If a VRRP virtual router is already configured and you are adding a new one, click on the **Add Virtual Router** link to display the VRRP configuration panel.
   - If you are modifying an existing VRRP virtual router, click on the **Modify** button to the right of the row describing the VRRP virtual router to display the VRRP configuration panel.
5. Select the interface from the pulldown list on the Port field. In this example, select 1/5.
6. Enter the VRID in the Router ID field. In this example, use the default value 1.
7. Enter the Hello interval or leave the field as is to use the default. The software fills in the default after you select Add. In this example, leave the field unchanged.
8. Select Enable to activate the VRRP entry after you select Add.
9. Enter the interface's IP address in the IP Address List field. In this example, enter 192.53.5.1. By entering the same IP address as the one associated with this VRID on the Owner, you configure the Backup to back up the address, but you are not duplicating the address.

**NOTE:** When you configure a Backup router, the router interface on which you are configuring the VRID must have a real IP address that is in the same sub-net as the address associated with the VRID by the Owner. However, the address cannot be the same.

10. Select the mode (Owner or Backup). Select Backup in this example.
11. Enter the backup priority or leave the value unchanged. In this example, enter 100.

**NOTE:** This is the default for Backups. You also can leave the field unchanged, and the software will automatically assign 100 as the priority when you select Add.

12. Enter the Dead interval or leave the field unchanged to use the default value.
13. Enable preempt mode if desired. In this example, leave preempt mode disabled.
14. Enter the track priority or leave the field blank to use the default. In this example, enter 19.
15. Enter or select the track interface or port:
   - If you want to use a virtual interface as a track port, enter the virtual interface name.
   - If you want to use a physical interface as a track port, select the port. In this example, select 3/2.
16. Click the Add button to apply the changes to the device's running-config.
17. Select the **Save** link at the bottom of the dialog, then select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.
VRRPE Example
To implement the VRRPE configuration shown in Figure 16.3 on page 16-7, use the following CLI method.

Configuring Router1 Using the CLI
To configure VRRP Router1 in Figure 16.3 on page 16-7, enter the following commands:

```
Router1(config)# router vrrp-extended
Router1(config)# interface ethernet 1/6
Router1(config-if-1/6)# ip address 192.53.5.2/24
Router1(config-if-1/6)# ip vrrp-extended vrid 1
Router1(config-if-1/6-vrid-1)# backup priority 110 track-priority 20
Router1(config-if-1/6-vrid-1)# track-port ethernet 2/4
Router1(config-if-1/6-vrid-1)# ip-address 192.53.5.254
Router1(config-if-1/6-vrid-1)# activate
VRRP router 1 for this interface is activating
Router1(config-if-1/6-vrid-1)# exit
```

```
Router1(config)# interface ethernet 1/6
Router1(config-if-1/6)# ip vrrp-extended vrid 2
Router1(config-if-1/6-vrid-1)# backup priority 100 track-priority 20
Router1(config-if-1/6-vrid-1)# track-port ethernet 2/4
Router1(config-if-1/6-vrid-1)# ip-address 192.53.5.253
Router1(config-if-1/6-vrid-1)# activate
VRRP router 2 for this interface is activating
```

**NOTE:** The address you enter with the `ip-address` command cannot be the same as a real IP address configured on the interface.

Configuring Router2 Using the CLI
To configure Router2, enter the following commands:

```
Router1(config)# router vrrp-extended
Router1(config)# interface ethernet 5/1
Router1(config-if-5/1)# ip address 192.53.5.3/24
Router1(config-if-5/1)# ip vrrp-extended vrid 1
Router1(config-if-5/1-vrid-1)# backup priority 100 track-priority 20
Router1(config-if-5/1-vrid-1)# track-port ethernet 3/2
Router1(config-if-5/1-vrid-1)# ip-address 192.53.5.254
Router1(config-if-5/1-vrid-1)# activate
VRRP router 1 for this interface is activating
Router1(config-if-5/1-vrid-1)# exit
```

```
Router1(config)# interface ethernet 5/1
Router1(config-if-5/1)# ip vrrp-extended vrid 2
Router1(config-if-5/1-vrid-1)# backup priority 110 track-priority 20
Router1(config-if-5/1-vrid-1)# track-port ethernet 2/4
Router1(config-if-5/1-vrid-1)# ip-address 192.53.5.253
Router1(config-if-5/1-vrid-1)# activate
VRRP router 2 for this interface is activating
```

The `backup` command specifies that this router is a VRRPE Backup for virtual router VRID1. The IP address entered with the `ip-address` command is the same IP address as the one entered when configuring Router1. In this case, the IP address cannot also exist on Router2, but the interface on which you are configuring the VRID Backup must have an IP address in the same sub-net. By entering the same IP address as the one associated with this VRID on the Owner, you are configuring the Backup to back up the address, but you are not duplicating the address.
NOTE: When you configure a Backup router, the router interface on which you are configuring the VRID must have a real IP address that is in the same sub-net as the address associated with the VRID by the Owner. However, the address cannot be the same.

The priority parameter establishes the router’s VRRPE priority in relation to the other VRRPE router(s) in this virtual router. The track-priority parameter specifies the new VRRPE priority that the router receives for this VRID if the interface goes down. See “Track Ports and Track Priority” on page 16-5.

The activate command activates the VRID configuration on this interface. The interface does not provide backup service for the virtual IP address until you activate the VRRPE configuration. Alternatively, you can use the enable command. The activate and enable commands do the same thing.

**Syntax:** router vrrp-extended

**Syntax:** ip vrrp-extended vrid <vrid>

**Syntax:** backup [priority <value>] [track-priority <value>]

**Syntax:** track-port ethernet <portnum> | ve <num>

**Syntax:** ip-address <ip-addr>

**Syntax:** activate

**USING THE WEB MANAGEMENT INTERFACE**

**Enabling VRRPE**

To enable VRRPE using the Web management interface, do the following:

1. Log on to the device using a valid user name and password for read-write access. The System configuration panel is displayed.

2. If VRRPE is not displayed on the System configuration panel, click Disable next to the virtual router that is currently enabled, then click Apply.

**NOTE:** Only one of the virtual router protocols (VRRP, VRRPE, or VSRP) can be enabled. Also, configuration data will be lost whenever you disable any of the virtual router protocol.

---

### Table: Policy Based VLANs

<table>
<thead>
<tr>
<th>Policy Based VLANs</th>
<th>Port</th>
<th>L3 Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spanning Tree</th>
<th>Disable</th>
<th>Enable</th>
<th>Single</th>
<th>Fast</th>
</tr>
</thead>
<tbody>
<tr>
<td>QOS</td>
<td>Short</td>
<td>Weighted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2 Switching</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSPF</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIP</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPX</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVMRP</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIM</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPLE TALK</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BGP</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VRRPE</td>
<td>Disable</td>
<td>Enable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Move:** Advanced... | apply | Reset

3. Click on Enable next to VRRPE to enable it.

4. Click on the Apply button to apply your changes.

---

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5. Select the Save link at the bottom of the dialog. Select Yes when prompted to save the configuration change to the startup-config file on the device’s flash memory.

After enabling VRRPE, options for other virtual routers (such as VRRP) are removed from the System configuration panel.

**Configuring VRRPE Parameters**

Once VRRPE is enabled, default values are applied to the ports on the Routing Switch. You can change the values for individual ports by doing the following:

1. Log on to the device using a valid user name and password for read-write access. The System configuration panel is displayed.
2. Click on the plus sign next to Configure in the tree view to expand the list of configuration options.
3. Click on the plus sign next to Virtual Redundant Router to expand the list of Virtual Router options.
4. Click on the plus sign next to VRRP-Extended to display its list of options.
5. Click on the Virtual Router link to display the VRRPE parameters.
   - If Virtual Routers have been configured for the device, you see a list as in Figure 16.4. Click on Modify to make changes to the VRRPE configuration, or click on the Add virtual router link to add another virtual router.

**Figure 16.4 List of Configured VRRPE Routers**

| Port | VR Id | Hello Inv | Admin Status | VIP | Master Ip | Ip Address Count | Mode | State | Track Priority | Cfg Priority | Cor Priority | Dead Inv | Preempt | Adv Backup | Track ports |
|------|-------|-----------|--------------|-----|-----------|------------------|------|-------|----------------|--------------|-------------|---------|---------|------------|------------|------------|
| 12/1 | 1     | Disable   |              |     | Unknown   | 0                | Backup Initialize | 5    | 100   | 100            | 0           | Enable      | Enable  | p50,60  | Delete     | Modify     |
| 12/7 | 1     | Disable   |              |     | Unknown   | 0                | Backup Initialize | 5    | 100   | 90             | 0           | Enable      | Enable  | p50,60  | Delete     | Modify     |

- If Virtual Routers have not been configured, you see the VRRPE configuration panel (Figure 16.5):
6. Select the interface to which the configuration will be applied from the Port field.

7. Enter the VRID in the Router ID field. By default, VRID 1 is assigned to an interface.

8. By default, VRRPE is enabled for the specified interface and VRID. Click on Disable next to Activate if you want to disable VRRPE for the interface and VRID. Click on Enable to re-enable it.

9. Enter the Hello Interval or leave the field unchanged to use the default. The Hello Interval determines the number of seconds between Hello messages from the Master to the Backups for a given VRID. The interval can from 1 – 84 seconds. The default for this is 1 second.

10. Enter the IP address that this VRID is backing up.

11. Backup is always displayed for the Mode field for VRRPE.

12. Enter the backup priority value in the Priority field. Backup priority is the device’s preferability for becoming the Master for the VRID. During negotiation, the router with the highest priority becomes the Master. The default Backup Priority is 100.

13. Enter the number of seconds for the Hello Interval for the backup.

14. Enter the number of seconds for the Dead Interval. This interval is the amount of time a Backup waits for a Hello message from the Master before determining that the Master is no longer active. If the Master does not
send a Hello message before the dead interval expires, the Backups negotiate (compare priorities) to select a new Master for the VRID. The default Dead Interval is three times the Hello Interval plus one-half second.

15. Select Enable for the Activate Backup field if you want to advertise routes to a backed up VRID even when the router is not the current active router for the VRID. Disabling the advertisements helps ensure that other routers do not receive invalid route paths for the VRID. The default is Disabled.

16. Select Enable for the Preempt field to prevent a Backup with a higher VRRP priority from taking control of the VRID from another Backup that has a lower priority but has already assumed control of the VRID. Select Disable if you do not want to disable this feature. The default is enabled.

17. Enter the Track – Priority value or leave it blank to use the default. If a tracked port's link goes down, the VRID port's priority is reduced by the amount of the tracked port's priority. The default Track Priority value for VRRPE is 5.

18. Place a check mark in the box for a port in Track Ports section. Ports with check marks are tracked. If the link for a tracked port goes down, the VRRP priority of the VRID interface is changed, causing the devices to renegotiate for Master.

The Track Ports area also shows which port links are up and which are down. The green color identifies ports that are up; whereas, red shows those that are down.

19. Click on the Add button to add the VRRPE port.

20. Select the Save link at the bottom of the dialog. Select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.

**Modifying Interface Authentication**

You can modify the password that was configured for a port on a separate panel of the Web management interface.

1. Log on to the device using a valid user name and password for read-write access. The System configuration dialog is displayed.

2. Make sure VRRPE is enabled.

3. Click on the plus sign next to Configure in the tree view to expand the list of configuration options.

4. Click on the plus sign next to Virtual Redundant Router to expand the list of Virtual Router options.

5. Click on the plus sign next to VRRP-Extended to display its list of options.

6. Click on the Interface link to display the VRRPE Interface table, which lists all the ports on the device.
7. Click on the Modify button for an interface if you want to make changes to its authentication type and password. The VRRP-E Interface configuration panel appears.

8. Select the Port number to which the configuration will apply. All the device's interfaces are listed in the pull down menu.

9. Select the Authentication Type, either None, Simple Text Password or Ip Auth header.

10. Enter a password if the authentication is Simple Text Password. Leave this field blank if other password types are used.

11. Click on the Apply button to apply your changes.

12. Select the Save link at the bottom of the dialog. Select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.
Configuring VRRP and VRRPE

Displaying VRRPE Statistics

To display VRRPE statistics using the Web management interface, do the following:

1. Log on to the device using a valid user name and password for read-write access. The System configuration panel is displayed.

2. Click on the plus sign next to Monitor in the tree view to expand the list of configuration options.

3. Click on the plus sign next to Virtual Redundant Router to expand the list of Virtual Router options.

4. Click on the plus sign next to VRRP-Extended to display its list of options.

5. To display statistics for authentication used by the VRRPE, click on the Interface link.

<table>
<thead>
<tr>
<th>Port</th>
<th>Header Error</th>
<th>Authen Type Error</th>
<th>Authen Password Mismatch Error</th>
<th>Virtual Router ID Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>12T</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12G</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The panel shows the following information:

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>The interface on which VRRP or VRRPE is configured. If VRRP or VRRPE is configured on more than one interface, the display lists the statistics separately for each interface.</td>
</tr>
<tr>
<td>Header Error</td>
<td>The number of VRRPE packets received by the interface that had a header error.</td>
</tr>
<tr>
<td>Authen Type Error</td>
<td>The number of VRRPE packets received by the interface that had an authentication error.</td>
</tr>
<tr>
<td>Authen Password Mismatch Error</td>
<td>The number of VRRP or VRRPE packets received by the interface that had a password value that does not match the password used by the interface for authentication.</td>
</tr>
<tr>
<td>Virtual Router ID Error</td>
<td>The number of VRRP or VRRPE packets received by the interface that contained a VRID that is not configured on this interface.</td>
</tr>
</tbody>
</table>
1. To display statistics all other statistics for a port, click on the Virtual Router link.

### VRRP-E Virtual Router

<table>
<thead>
<tr>
<th>Port</th>
<th>VR Id</th>
<th>State</th>
<th>Receive Pkts Drop</th>
<th>Receive Mismatch</th>
<th>Rev Priority Zero from Master</th>
<th>Rev Higher Priority</th>
<th>Transmit Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/21</td>
<td>1</td>
<td>Initialize</td>
<td>0 0 0 0 0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1/27</td>
<td>1</td>
<td>Initialize</td>
<td>0 0 0 0 0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The panel shows the following information:

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>Slot/port number of the interface.</td>
</tr>
<tr>
<td>VRId</td>
<td>The VRID for the port</td>
</tr>
<tr>
<td>State</td>
<td>Current state of the port. It can be:</td>
</tr>
<tr>
<td></td>
<td>• Initialize</td>
</tr>
<tr>
<td></td>
<td>• Master</td>
</tr>
<tr>
<td></td>
<td>• Backup</td>
</tr>
<tr>
<td>Receive Pkts Drop</td>
<td>Number of packets addressed to the VRID that were dropped. Packets are divided into the following categories:</td>
</tr>
<tr>
<td></td>
<td>• ARP packets</td>
</tr>
<tr>
<td></td>
<td>• IP packets</td>
</tr>
<tr>
<td>Receive Mismatch</td>
<td>Number of packets that did not match the configured values of the following:</td>
</tr>
<tr>
<td></td>
<td>• Port – receiving interface</td>
</tr>
<tr>
<td></td>
<td>• IP – IP addresses</td>
</tr>
<tr>
<td></td>
<td>• Hello – Hello interval</td>
</tr>
<tr>
<td>Receive Priority Zero from Master</td>
<td>Number of times the current Master has resigned</td>
</tr>
<tr>
<td>Receive Higher Priority</td>
<td>The number of VRRPE packets received by the interface that had a higher backup priority for the VRID than this Routing Switch's backup priority for the VRID.</td>
</tr>
<tr>
<td>Transition Count</td>
<td>The number of times this Routing Switch has changed the state of its VRID:</td>
</tr>
<tr>
<td></td>
<td>• Master – transition from Backup to Master</td>
</tr>
<tr>
<td></td>
<td>• Backup – transition Master to Backup</td>
</tr>
</tbody>
</table>