Chapter 13
Configuring
GARP VLAN Registration Protocol (GVRP)

GARP VLAN Registration Protocol (GVRP) is a Generic Attribute Registration Protocol (GARP) application that provides VLAN registration service by means of dynamic configuration (registration) and distribution of VLAN membership information.

An HP device enabled for GVRP can do the following:

- Learn about VLANs from other HP devices and configure those VLANs on the ports that learn about the VLANs. The device listens for GVRP Protocol Data Units (PDUs) from other devices, and implements the VLAN configuration information in the PDUs.
- Advertise VLANs configured on the device to other HP devices. The device sends GVRP PDUs advertising its VLANs to other devices. GVRP advertises statically configured VLANs and VLANs learned from other devices through GVRP.

GVRP enables an HP device to dynamically create 802.1Q-compliant VLANs on links with other devices that are running GVRP. GVRP reduces the chances for errors in VLAN configuration by automatically providing VLAN ID consistency across the network. You can use GVRP to propagate VLANs to other GVRP-aware devices automatically, without the need to manually configure the VLANs on each device. In addition, if the VLAN configuration on a device changes, GVRP automatically changes the VLAN configurations of the affected devices.

The HP implementation of GARP and GVRP is based on the following standards:

- IEEE draft P802.1w/D10, March 26, 2001
- IEEE draft P802.1u/D9, November 23, 2000
- IEEE draft P802.11/D10, November 20, 2000

Application Examples

Figure 13.1 shows an example of a network that uses GVRP. This section describes various ways you can use GVRP in a network such as this one. “CLI Examples” on page 13-17 lists the CLI commands to implement the applications of GVRP described in this section.
In this example, a core device is attached to three edge devices. Each of the edge devices is attached to other edge devices or host stations (represented by the clouds).

The effects of GVRP in this network depend on which devices the feature is enabled on, and whether both learning and advertising are enabled. In this type of network (a core device and edge devices), you can have the following four combinations:

- Dynamic core and fixed edge
- Dynamic core and dynamic edge
- Fixed core and dynamic edge
- Fixed core and fixed edge

**Dynamic Core and Fixed Edge**

In this configuration, all ports on the core device are enabled to learn and advertise VLAN information. The edge devices are configured to advertise their VLAN configurations on the ports connected to the core device. GVRP learning is disabled on the edge devices.
Both learning and advertising are enabled.

**Note:** Since learning is disabled on all the edge devices, advertising on the core device has no effect in this configuration.

<table>
<thead>
<tr>
<th>Core Device</th>
<th>Edge Device A</th>
<th>Edge Device B</th>
<th>Edge Device C</th>
</tr>
</thead>
<tbody>
<tr>
<td>GVRP is enabled on all ports.</td>
<td>GVRP is enabled on port 4/24. Learning is disabled.</td>
<td>GVRP is enabled on port 4/1. Learning is disabled.</td>
<td>GVRP is enabled on port 4/1. Learning is disabled.</td>
</tr>
<tr>
<td>Both learning and advertising are enabled.</td>
<td>VLAN 20</td>
<td>VLAN 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port 2/1 (untagged)</td>
<td>Port 2/24 (untagged)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port 4/24 (tagged)</td>
<td>Port 4/1 (tagged)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VLAN 40</td>
<td>VLAN 30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port 4/1 (untagged)</td>
<td>Port 4/4 (untagged)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port 4/24 (tagged)</td>
<td>Port 4/1 (tagged)</td>
<td></td>
</tr>
</tbody>
</table>

In this configuration, the edge devices are statically (manually) configured with VLAN information. The core device dynamically configures itself to be a member of each of the edge device’s VLANs. The operation of GVRP on the core device results in the following VLAN configuration on the device:

- VLAN 20
  - 1/24 (tagged)
  - 6/24 (tagged)
- VLAN 30
  - 6/24 (tagged)
  - 8/17 (tagged)
- VLAN 40
  - 1/24 (tagged)
  - 8/17 (tagged)

VLAN 20 traffic can now travel through the core between edge devices A and B. Likewise, VLAN 30 traffic can travel between B and C and VLAN 40 traffic can travel between A and C. If an edge device is moved to a different core port or the VLAN configuration of an edge device is changed, the core device automatically reconfigures itself to accommodate the change.

Notice that each of the ports in the dynamically created VLANs is tagged. All GVRP VLAN ports configured by GVRP are tagged, to ensure that the port can be configured for additional VLANs.

**NOTE:** This example assumes that the core device has no static VLANs configured. However, you can have static VLANs on a device that is running GVRP. GVRP can dynamically add other ports to the statically configured VLANs but cannot delete statically configured ports from the VLANs.

**Dynamic Core and Dynamic Edge**

GVRP is enabled on the core device and on the edge devices. This type of configuration is useful if the devices in the edge clouds are running GVRP and advertise their VLANs to the edge devices. The edge devices learn the VLANs and also advertise them to the core. In this configuration, you do not need to statically configure the VLANs on the edge or core devices, although you can have statically configured VLANs on the devices. The devices learn the VLANs from the devices in the edge clouds.
**Fixed Core and Dynamic Edge**

GVRP learning is enabled on the edge devices. The VLANs on the core device are statically configured, and the core device is enabled to advertise its VLANs but not to learn VLANs. The edge devices learn the VLANs from the core.

**Fixed Core and Fixed Edge**

The VLANs are statically configured on the core and edge devices. On each edge device, VLAN advertising is enabled but learning is disabled. GVRP is not enabled on the core device. This configuration enables the devices in the edge clouds to learn the VLANs configured on the edge devices.

**VLAN Names**

The `show vlans` command lists VLANs created by GVRP as “GVRP_VLAN.<vlan-id>”. VLAN names for statically configured VLANs are not affected. To distinguish between statically-configured VLANs that you add to the device and VLANs that you convert from GVRP-configured VLANs into statically-configured VLANs, the `show vlans` command displays a converted VLAN's name as “STATIC_VLAN.<vlan-id>”.

**Configuration Considerations**

- If you disable GVRP, all GVRP configuration information is lost if you save the configuration change (write memory command) and then reload the software. However, if you reload the software without first saving the configuration change, the GVRP configuration is restored following a software reload.

- The maximum number of VLANs supported on a device enabled for GVRP is the same as the maximum number on a device that is not enabled for GVRP.
  
  - To display the maximum number of VLANs allowed on your device, enter the `show default values` command. See the “vlan” row in the System Parameters section. Make sure you allow for the default VLAN (1), the GVRP base VLAN (4093), and the Single STP VLAN (4094). These VLANs are maintained as “Registration Forbidden” in the GVRP database. Registration Forbidden VLANs cannot be advertised or learned by GVRP.

  - To increase the maximum number of VLANs supported on the device, enter the `system-max vlan <num>` command at the global CONFIG level of the CLI, then save the configuration and reload the software. The maximum number you can specify is listed in the Maximum column of the `show default values` display.

  - The default VLAN (VLAN 1) is not advertised by the HP implementation of GVRP. The default VLAN contains all ports that are not members of statically configured VLANs or VLANs enabled for GVRP.

  **NOTE:** The default VLAN has ID 1 by default. You can change the VLAN ID of the default VLAN, but only before GVRP is enabled. You cannot change the ID of the default VLAN after GVRP is enabled.

- Single STP must be enabled on the device. HP’s implementation of GVRP requires Single STP. If you do not have any statically configured VLANs on the device, you can enable Single STP as follows:

  ```sh
  ProCurveRS(config)# vlan 1
  ProCurveRS(config-vlan-1)# exit
  ProCurveRS(config)# span
  ProCurveRS(config)# span single
  ```

  These commands enable configuration of the default VLAN (VLAN 1), which contains all the device’s ports, and enable STP and Single STP.

  - All VLANs that are learned dynamically through GVRP are added to the single spanning tree.
  
  - All ports that are enabled for GVRP become tagged members of the GVRP base VLAN (4093). If you need to use this VLAN ID for another VLAN, you can change the GVRP VLAN ID. See “Changing the GVRP Base VLAN ID” on page 13-5. The software adds the GVRP base VLAN to the single spanning tree.
• All VLAN ports added by GVRP are tagged.
• GVRP is supported only for tagged ports or for untagged ports that are members of the default VLAN. GVRP is not supported for ports that are untagged and are members of a VLAN other than the default VLAN.
• To configure GVRP on a trunk group, enable the protocol on the primary port in the trunk group. The GVRP configuration of the primary port is automatically applied to the other ports in the trunk group.
• You can use GVRP on a device even if the device has statically configured VLANs. GVRP does not remove any ports from the statically configured VLANs, although GVRP can add ports to the VLANs. GVRP advertises the statically configured VLANs. Ports added by GVRP do not appear in the running-config and will not appear in the startup-config file when save the configuration. You can manually add a port to make the port a permanent member of the VLAN. After you manually add the port, the port will appear in the running-config and be saved to the startup-config file when you save the configuration.
• VLANs created by GVRP do not support virtual routing interfaces or protocol-based VLANs. virtual routing interfaces and protocol-based VLANs are still supported on statically configured VLANs even if GVRP adds ports to those VLANs.
• You cannot manually configure any parameters on a VLAN that is created by GVRP. For example, you cannot change STP parameters for the VLAN.
• The GVRP timers (Join, Leave, and Leaveall) must be set to the same values on all the devices that are exchanging information using GVRP.
• If the network has a large number of VLANs, the GVRP traffic can use a lot of CPU resources. If you notice high CPU utilization after enabling GVRP, set the GVRP timers to longer values. In particular, set the Leaveall timer to a longer value. See “Changing the GVRP Timers” on page 13-7.
• The feature is supported only on Ethernet ports.

**NOTE:** If you plan to change the GVRP base VLAN ID (4093) or the maximum configurable value for the Leaveall timer (300000 ms by default), you must do so before you enable GVRP.

### Configuring GVRP

To configure a device for GVRP, globally enable support for the feature, then enable the feature on specific ports. Optionally, you can disable VLAN learning or advertising on specific interfaces.

You also can change the protocol timers and change the GVRP base VLAN ID.

### Changing the GVRP Base VLAN ID

By default, GVRP uses VLAN 4093 as a base VLAN for the protocol. All ports that are enabled for GVRP become tagged members of this VLAN. If you need to use VLAN ID 4093 for a statically configured VLAN, you can change the GVRP base VLAN ID.

**NOTE:** If you want to change the GVRP base VLAN ID, you must do so before enabling GVRP.

To change the GVRP base VLAN ID, enter a command such as the following at the global CONFIG level of the CLI:

```
ProCurveRS(config)# gvrp-base-vlan-id 1001
```

This command changes the GVRP VLAN ID from 4093 to 1001.

**Syntax:** `[no] gvrp-base-vlan-id <vlan-id>`

The `<vlan-id>` parameter specifies the new VLAN ID. You can specify a VLAN ID from 2 – 4092 or 4095.
**Increasing the Maximum Configurable Value of the Leaveall Timer**

By default, the highest value you can specify for the Leaveall timer is 300000 ms. You can increase the maximum configurable value of the Leaveall timer to 1000000 ms.

**NOTE:** You must enter this command before enabling GVRP. Once GVRP is enabled, you cannot change the maximum Leaveall timer value.

**NOTE:** This command does not change the default value of the Leaveall timer itself. The command only changes the maximum value to which you can set the Leaveall timer.

To increase the maximum value you can specify for the Leaveall timer, enter a command such as the following at the global CONFIG level of the CLI:

```bash
ProCurveRS(config)# gvrp-max-leaveall-timer 1000000
```

**Syntax:** [no] gvrp-max-leaveall-timer <ms>

The `<ms>` parameter specifies the maximum number of ms to which you can set the Leaveall timer. You can specify from 300000 – 1000000 (one million) ms. The value must be a multiple of 100 ms. The default is 300000 ms.

**Enabling GVRP**

To enable GVRP, enter commands such as the following at the global CONFIG level of the CLI:

```bash
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable all
```

The first command globally enables support for the feature and changes the CLI to the GVRP configuration level. The second command enables GVRP on all ports on the device.

The following command enables GVRP on ports 1/24, 6/24, and 8/17:

```bash
ProCurveRS(config-gvrp)# enable ethernet 1/24 ethernet 6/24 ethernet 8/17
```

**Syntax:** [no] gvrp-enable

**Syntax:** [no] enable all | ethernet <portnum> [ethernet <portnum> | to <portnum>]

The `all` parameter enables GVRP on all ports.

The `ethernet <portnum>` parameter enables GVRP on the specified list or range of Ethernet ports.

- To specify a list, enter each port as `ethernet <portnum>` followed by a space. For example, to enable GVRP on three Ethernet ports, enter the following command: `enable ethernet 1/24 ethernet 6/24 ethernet 8/17`

- To specify a range, enter the first port in the range as `ethernet <portnum>` followed by `to` followed by the last port in the range. For example, to add ports 1/1 – 1/8, enter the following command: `enable ethernet 1/1 to 1/8`

You can combine lists and ranges in the same command. For example: `enable ethernet 1/1 to 1/8 ethernet 1/24 ethernet 6/24 ethernet 8/17`

**Disabling VLAN Advertising**

To disable VLAN advertising on a port enabled for GVRP, enter a command such as the following at the GVRP configuration level:

```bash
ProCurveRS(config-gvrp)# block-applicant ethernet 1/24 ethernet 6/24 ethernet 8/17
```

This command disables advertising of VLAN information on ports 1/24, 6/24, and 8/17.

**Syntax:** [no] block-applicant all | ethernet <portnum> [ethernet <portnum> | to <portnum>]
NOTE: Leave all messages are still sent on the GVRP ports.

Disabling VLAN Learning
To disable VLAN learning on a port enabled for GVRP, enter a command such as the following at the GVRP configuration level:

ProCurveRS(config-gvrp)# block-learning ethernet 6/24

This command disables learning of VLAN information on port 6/24.

NOTE: The port still advertises VLAN information unless you also disable VLAN advertising.

Syntax: [no] block-learning all | ethernet <portnum> [ethernet <portnum> | to <portnum>]

Changing the GVRP Timers
GVRP uses the following timers:

- Join – The maximum number of milliseconds (ms) a device’s GVRP interfaces wait before sending VLAN advertisements on the interfaces. The actual interval between Join messages is randomly calculated to a value between 0 and the maximum number of milliseconds specified for Join messages. You can set the Join timer to a value from 200 – one third the value of the Leave timer. The default is 200 ms.

- Leave – The number of ms a GVRP interface waits after receiving a Leave message on the port to remove the port from the VLAN indicated in the Leave message. If the port receives a Join message before the Leave timer expires, GVRP keeps the port in the VLAN. Otherwise, the port is removed from the VLAN. When a port receives a Leave message, the port’s GVRP state is changed to Leaving. Once the Leave timer expires, the port’s GVRP state changes to Empty. You can set the Leave timer to a value from three times the Join timer – one fifth the value of the Leaveall timer. The default is 600 ms.

NOTE: When all ports in a dynamically created VLAN (one learned through GVRP) leave the VLAN, the VLAN is immediately deleted from the device’s VLAN database. However, this empty VLAN is still maintained in the GVRP database for an amount of time equal to the following:

\[(\text{number-of-GVRP-enabled-up-ports}) \times (2 \times \text{join-timer})\]

While the empty VLAN is in the GVRP database, the VLAN does not appear in the show vlans display but does still appear in the show gvrp vlan all display.

- Leaveall – The minimum interval at which GVRP sends Leaveall messages on all GVRP interfaces. Leaveall messages ensure that the GVRP VLAN membership information is current by aging out stale VLAN information and adding information for new VLAN memberships, if the information is missing. A Leaveall message instructs the port to change the GVRP state for all its VLANs to Leaving, and remove them unless a Join message is received before the Leave timer expires. By default, you can set the Leaveall timer to a value from five times the Leave timer – maximum value allowed by software (configurable from 300000 – 1000000 ms). The default is 10000.

NOTE: The actual interval is a random value between the Leaveall interval and 1.5 * the Leaveall time or the maximum Leaveall time, whichever is lower.

NOTE: You can increase the maximum configurable value of the Leaveall timer from 300000 ms up to 1000000 ms using the gvrp-max-leaveall-timer command. (See “Increasing the Maximum Configurable Value of the Leaveall Timer” on page 13-6.)
**Timer Configuration Requirements**

- All timer values must be in multiples of 100 ms.
- The Leave timer must be >= 3* the Join timer.
- The Leaveall timer must be >= 5* the Leave timer.
- The GVRP timers must be set to the same values on all the devices that are exchanging information using GVRP.

**Changing the Join, Leave, and Leaveall Timers**

The same CLI command controls changes to the Join, Leave, and Leaveall timers. To change values to the timers, enter a command such as the following:

```
ProCurveRS(config-gvrp)# join-timer 1000 leave-timer 3000 leaveall-timer 15000
```

This command changes the Join timer to 1000 ms, the Leave timer to 3000 ms, and the Leaveall timer to 15000.

**Syntax:** [no] join-timer &lt;ms&gt; leave-timer &lt;ms&gt; leaveall-timer &lt;ms&gt;

**NOTE:** When you enter this command, all the running GVRP timers are canceled and restarted using the new times specified by the command.

**Resetting the Timers to Their Defaults**

To reset the Join, Leave, and Leaveall timers to their default values, enter the following command:

```
ProCurveRS(config-gvrp)# default-timers
```

**Syntax:** default-timers

This command resets the timers to the following values:

- Join – 200 ms
- Leave – 600 ms
- Leaveall – 10000 ms

**Converting a VLAN Created by GVRP into a Statically-Configured VLAN**

You cannot configure VLAN parameters on VLANs created by GVRP. Moreover, VLANs and VLAN ports added by GVRP do not appear in the running-config and cannot be saved in the startup-config file.

To be able to configure and save VLANs or ports added by GVRP, you must convert the VLAN ports to statically-configured ports.

To convert a VLAN added by GVRP into a statically-configured VLAN, add the ports using commands such as the following:

```
ProCurveRS(config)# vlan 22
ProCurveRS(config-vlan-222)# tagged ethernet 1/1 to 1/8
```

These commands convert GVRP-created VLAN 22 containing ports 1/1 through 1/8 into statically-configured VLAN 22.

**Syntax:** [no] vlan &lt;vlan-id&gt;

**Syntax:** [no] tagged ethernet &lt;portnum&gt; [to &lt;portnum&gt; | ethernet &lt;portnum&gt;]

Use the same commands to statically add ports that GVRP added to a VLAN.

**NOTE:** You cannot add the VLAN ports as untagged ports.
NOTE: After you convert the VLAN, the VLAN name changes from "GVRP_VLAN_<vlan-id>" to "STATIC_VLAN_<vlan-id>".

Displaying GVRP Information

You can display the following GVRP information:

- GVRP configuration information
- GVRP VLAN information
- GVRP statistics
- CPU utilization statistics
- GVRP diagnostic information

Displaying GVRP Configuration Information

To display GVRP configuration information, enter a command such as the following:

ProCurveRS(config)# show gvrp
GVRP is enabled on the system

GVRP BASE VLAN ID : 4093
GVRP MAX Leaveall Timer : 300000 ms

GVRP Join Timer : 200 ms
GVRP Leave Timer : 600 ms
GVRP Leave-all Timer : 10000 ms

Configuration that is being used:

block-learning ethe 1/3
block-applicant ethe 2/7 ethe 2/11
enable ethe 1/1 to 1/7 ethe 2/1 ethe 2/7 ethe 2/11

Spanning Tree: SINGLE SPANNING TREE
Dropped Packets Count: 0

Number of VLANs in the GVRP Database: 15
Maximum Number of VLANs that can be present: 4095

Syntax: show gvrp [ethernet <port-num>]
This display shows the following information.

### Table 13.1: CLI Display of Summary GVRP Information

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol state</td>
<td>The state of GVRP. The display shows one of the following: • GVRP is disabled on the system • GVRP is enabled on the system</td>
</tr>
<tr>
<td>GVRP BASE VLAN ID</td>
<td>The ID of the base VLAN used by GVRP.</td>
</tr>
<tr>
<td>GVRP MAX Leaveall Timer</td>
<td>The maximum number of ms to which you can set the Leaveall timer. <strong>Note:</strong> To change the maximum value, see “Increasing the Maximum Configurable Value of the Leaveall Timer” on page 13-6.</td>
</tr>
<tr>
<td>GVRP Join Timer</td>
<td>The value of the Join timer. <strong>Note:</strong> For descriptions of the Join, Leave, and Leaveall timers or to change the timers, see “Changing the GVRP Timers” on page 13-7.</td>
</tr>
<tr>
<td>GVRP Leave Timer</td>
<td>The value of the Leave timer.</td>
</tr>
<tr>
<td>GVRP Leave-all Timer</td>
<td>The value of the Leaveall timer.</td>
</tr>
<tr>
<td>Configuration that is being used</td>
<td>The configuration commands used to enable GVRP on individual ports. If GVRP learning or advertising is disabled on a port, this information also is displayed.</td>
</tr>
<tr>
<td>Spanning Tree</td>
<td>The type of STP enabled on the device. <strong>Note:</strong> The current release supports GVRP only with Single STP.</td>
</tr>
<tr>
<td>Dropped Packets Count</td>
<td>The number of GVRP packets that the device has dropped. A GVRP packet can be dropped for either of the following reasons: • GVRP packets are received on a port on which GVRP is not enabled. <strong>Note:</strong> If GVRP support is not globally enabled, the device does not drop the GVRP packets but instead forwards them at Layer 2. • GVRP packets are received with an invalid GARP Protocol ID. The protocol ID must always be 0x0001.</td>
</tr>
<tr>
<td>Number of VLANs in the GVRP Database</td>
<td>The number of VLANs in the GVRP database. <strong>Note:</strong> This number includes the default VLAN (1), the GVRP base VLAN (4093), and the single STP VLAN (4094). These VLANs are not advertised by GVRP but are maintained as “Registration Forbidden”.</td>
</tr>
<tr>
<td>Maximum Number of VLANs that can be present</td>
<td>The maximum number of VLANs that can be configured on the device. This number includes statically configured VLANs, VLANs learned through GVRP, and VLANs 1, 4093, and 4094. To change the maximum number of VLANs the device can have, use the <code>system-max vlan &lt;num&gt;</code> command. See “Displaying and Modifying System Parameter Default Settings” on page 6-43.</td>
</tr>
</tbody>
</table>
To display detailed GVRP information for an individual port, enter a command such as the following:

```
ProCurveRS(config)# show gvrp ethernet 2/1
Port 2/1 -
  GVRP Enabled  : YES
  GVRP Learning : ALLOWED
  GVRP Applicant : ALLOWED
  Port State     : UP
  Forwarding     : YES

VLAN Membership:   [VLAN-ID]    [MODE]
                    1           FORBIDDEN
                    2           FIXED
                   1001        NORMAL
                   1003        NORMAL
                   1004        NORMAL
                   1007        NORMAL
                   1009        NORMAL
                   1501        NORMAL
                   2507        NORMAL
                   4001        NORMAL
                   4093        FORBIDDEN
                   4094        FORBIDDEN
```

This display shows the following information.

**Table 13.2: CLI Display of Detailed GVRP Information for a Port**

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port number</td>
<td>The port for which information is being displayed.</td>
</tr>
<tr>
<td>GVRP Enabled</td>
<td>Whether GVRP is enabled on the port.</td>
</tr>
<tr>
<td>GVRP Learning</td>
<td>Whether the port can learn VLAN information from GVRP.</td>
</tr>
<tr>
<td>GVRP Applicant</td>
<td>Whether the port can advertise VLAN information into GVRP.</td>
</tr>
<tr>
<td>Port State</td>
<td>The port's link state, which can be UP or DOWN.</td>
</tr>
<tr>
<td>Forwarding</td>
<td>Whether the port is in the GVRP Forwarding state:</td>
</tr>
<tr>
<td></td>
<td>• NO – The port is in the Blocking state.</td>
</tr>
<tr>
<td></td>
<td>• YES – The port is in the Forwarding state.</td>
</tr>
</tbody>
</table>
Table 13.2: CLI Display of Detailed GVRP Information for a Port (Continued)

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLAN Membership</td>
<td>The VLANs of which the port is a member. For each VLAN, the following information is shown:</td>
</tr>
<tr>
<td></td>
<td>• VLAN ID – The VLAN's ID.</td>
</tr>
<tr>
<td></td>
<td>• Mode – The type of VLAN, which can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>• FIXED – The port will always be a member of this VLAN and the VLAN will always be advertised on this port by GVRP. A port becomes FIXED when you configure the port as a tagged member of a statically configured VLAN.</td>
</tr>
<tr>
<td></td>
<td>• FORBIDDEN – The VLAN is one of the special VLANs that is not advertised or learned by GVRP. In the current release, the following VLANs are forbidden: the default VLAN (1), the GVRP base VLAN (4093), or the Single STP VLAN (4094).</td>
</tr>
<tr>
<td></td>
<td>• NORMAL – The port became a member of this VLAN after learning about the VLAN through GVRP. The port's membership in the VLAN depends on GVRP. If the VLAN is removed from the ports that send GVRP advertisements to this device, then the port will stop being a member of the VLAN.</td>
</tr>
</tbody>
</table>

Displaying GVRP VLAN Information
To display information about all the VLANs on the device, enter the following command:

```
ProCurveRS(config)# show gvrp vlan brief
```

Number of VLANs in the GVRP Database: 7  
Maximum Number of VLANs that can be present: 4095

<table>
<thead>
<tr>
<th>[VLAN-ID]</th>
<th>[MODE]</th>
<th>[VLAN-INDEX]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STATIC-DEFAULT</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>STATIC</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>STATIC</td>
<td>4</td>
</tr>
<tr>
<td>1001</td>
<td>DYNAMIC</td>
<td>7</td>
</tr>
<tr>
<td>1003</td>
<td>DYNAMIC</td>
<td>8</td>
</tr>
<tr>
<td>4093</td>
<td>STATIC-GVRP-BASE-VLAN</td>
<td>6</td>
</tr>
<tr>
<td>4094</td>
<td>STATIC-SINGLE-SPAN-VLAN</td>
<td>5</td>
</tr>
</tbody>
</table>

Syntax: show gvrp vlan all | brief | <vlan-id>
This display shows the following information.

### Table 13.3: CLI Display of Summary VLAN Information for GVRP

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of VLANs in the GVRP Database</td>
<td>The number of VLANs in the GVRP database. <strong>Note:</strong> This number includes the default VLAN (1), the GVRP base VLAN (4093), and the single STP VLAN (4094). These VLANs are not advertised by GVRP but are included in the total count.</td>
</tr>
<tr>
<td>Maximum Number of VLANs that can be present</td>
<td>The maximum number of VLANs that can be configured on the device. This number includes statically configured VLANs, VLANs learned through GVRP, and VLANs 1, 4093, and 4094. To change the maximum number of VLANs the device can have, use the <code>system-max vlan &lt;num&gt;</code> command. See “Displaying and Modifying System Parameter Default Settings” on page 6-43.</td>
</tr>
<tr>
<td>VLAN-ID</td>
<td>The VLAN ID.</td>
</tr>
</tbody>
</table>
| MODE | The type of VLAN, which can be one of the following:  
  - STATIC – The VLAN is statically configured and cannot be removed by GVRP. This includes VLANs you have configured as well as the default VLAN (1), base GVRP VLAN (4093), and Single STP VLAN (4094).  
  - DYNAMIC – The VLAN was learned through GVRP. |
| VLAN-INDEX | A number used as an index into the internal database. |

To display detailed information for a specific VLAN, enter a command such as the following:

```
ProCurveRS(config)# show gvrp vlan 1001
VLAN-ID: 1001, VLAN-INDEX: 7, STATIC: NO, DEFAULT: NO, BASE-VLAN: NO  
Timer to Delete Entry Running: NO  
Legend: [S=Slot]  
Forbidden Members: None  
Fixed Members: None  
Normal(Dynamic) Members: (S2) 1
```

This display shows the following information.

### Table 13.4: CLI Display of Summary VLAN Information for GVRP

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLAN-ID</td>
<td>The VLAN ID.</td>
</tr>
<tr>
<td>VLAN-INDEX</td>
<td>A number used as an index into the internal database.</td>
</tr>
<tr>
<td>STATIC</td>
<td>Whether the VLAN is a statically configured VLAN.</td>
</tr>
</tbody>
</table>
Table 13.4: CLI Display of Summary VLAN Information for GVRP (Continued)

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFAULT</td>
<td>Whether this is the default VLAN.</td>
</tr>
<tr>
<td>BASE-VLAN</td>
<td>Whether this is the base VLAN for GVRP.</td>
</tr>
<tr>
<td>Timer to Delete Entry Running</td>
<td>Whether all ports have left the VLAN and the timer to delete the VLAN itself is running. The timer is described in the note for the Leave timer in “Changing the GVRP Timers” on page 13-7.</td>
</tr>
<tr>
<td>Legend</td>
<td>The meanings of the letter codes used in other parts of the display.</td>
</tr>
<tr>
<td>Forbidden Members</td>
<td>The ports that cannot become members of a VLAN advertised or learned by GVRP.</td>
</tr>
<tr>
<td>Fixed Members</td>
<td>The ports that are statically configured members of the VLAN. GVRP cannot remove these ports.</td>
</tr>
<tr>
<td>Normal(Dynamic) Members</td>
<td>The ports that were added by GVRP. These ports also can be removed by GVRP.</td>
</tr>
<tr>
<td>MODE</td>
<td>The type of VLAN, which can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>• STATIC – The VLAN is statically configured and cannot be removed by GVRP. This includes VLANs you have configured as well as the default VLAN (1), base GVRP VLAN (4093), and Single STP VLAN (4094).</td>
</tr>
<tr>
<td></td>
<td>• DYNAMIC – The VLAN was learned through GVRP.</td>
</tr>
</tbody>
</table>

To display detailed information for all VLANs, enter the `show gvrp vlan all` command.

**Displaying GVRP Statistics**

To display GVRP statistics for a port, enter a command such as the following:

```
ProCurveRS(config)# show gvrp statistics ethernet 2/1
PORT 2/1 Statistics:
  Leave All Received : 147
  Join Empty Received : 4193
  Join In Received : 599
  Leave Empty Received : 0
  Leave In Received : 0
  Empty Received : 588
  Leave All Transmitted : 157
  Join Empty Transmitted : 1794
  Join In Transmitted : 598
  Leave Empty Transmitted : 0
  Leave In Transmitted : 0
  Empty Transmitted : 1248
  Invalid Messages/Attributes Skipped : 0
  Failed Registrations : 0
```

**Syntax:** `show gvrp statistics all | ethernet <port-num>`
This display shows the following information for the port.

### Table 13.5: CLI Display of GVRP Statistics

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leave All Received</td>
<td>The number of Leaveall messages received.</td>
</tr>
<tr>
<td>Join Empty Received</td>
<td>The number of Join Empty messages received.</td>
</tr>
<tr>
<td>Join In Received</td>
<td>The number of Join In messages received.</td>
</tr>
<tr>
<td>Leave Empty Received</td>
<td>The number of Leave Empty messages received.</td>
</tr>
<tr>
<td>Leave In Received</td>
<td>The number of Leave In messages received.</td>
</tr>
<tr>
<td>Empty Received</td>
<td>The number of Empty messages received.</td>
</tr>
<tr>
<td>Leave All Transmitted</td>
<td>The number of Leaveall messages sent.</td>
</tr>
<tr>
<td>Join Empty Transmitted</td>
<td>The number of Join Empty messages sent.</td>
</tr>
<tr>
<td>Join In Transmitted</td>
<td>The number of Join In messages sent.</td>
</tr>
<tr>
<td>Leave Empty Transmitted</td>
<td>The number of Leave Empty messages sent.</td>
</tr>
<tr>
<td>Leave In Transmitted</td>
<td>The number of Leave In messages sent.</td>
</tr>
<tr>
<td>Empty Transmitted</td>
<td>The number of Empty messages sent.</td>
</tr>
<tr>
<td>Invalid Messages/Attributes Skipped</td>
<td>The number of invalid messages or attributes received or skipped.</td>
</tr>
<tr>
<td></td>
<td>This can occur in the following cases:</td>
</tr>
<tr>
<td></td>
<td>• The incoming GVRP PDU has an incorrect length.</td>
</tr>
<tr>
<td></td>
<td>• &quot;End of PDU&quot; was reached before the complete attribute could be parsed.</td>
</tr>
<tr>
<td></td>
<td>• The Attribute Type of the attribute that was being parsed was not the GVRP VID Attribute Type (0x01).</td>
</tr>
<tr>
<td></td>
<td>• The attribute that was being parsed had an invalid attribute length.</td>
</tr>
<tr>
<td></td>
<td>• The attribute that was being parsed had an invalid GARP event.</td>
</tr>
<tr>
<td></td>
<td>• The attribute that was being parsed had an invalid VLAN ID. The valid range is 1 – 4095.</td>
</tr>
<tr>
<td>Failed Registrations</td>
<td>The number of failed registrations that have occurred. A failed registration can occur for the following reasons:</td>
</tr>
<tr>
<td></td>
<td>• Join requests were received on a port that was blocked from learning dynamic VLANs (GVRP Blocking state).</td>
</tr>
<tr>
<td></td>
<td>• An entry for a new GVRP VLAN could not be created in the GVRP database.</td>
</tr>
</tbody>
</table>

To display GVRP statistics for all ports, enter the `show gvrp statistics all` command.

**Displaying CPU Utilization Statistics**

You can display CPU utilization statistics for GVRP.
To display CPU utilization statistics for GVRP 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>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>GVRP</td>
<td>0.00</td>
<td>0.03</td>
<td>0.04</td>
<td>0.07</td>
<td>4</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>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</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.
```

<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>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>BGP</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</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>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1</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>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Process Name</th>
<th>Sec(%)</th>
<th>Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARP</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>BGP</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>GVRP</td>
<td>0.01</td>
<td>1</td>
</tr>
<tr>
<td>ICMP</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>IP</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>OSPF</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>RIP</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>STP</td>
<td>0.01</td>
<td>1</td>
</tr>
<tr>
<td>VRRP</td>
<td>0.00</td>
<td>0</td>
</tr>
</tbody>
</table>

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>]

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.
Displaying GVRP Diagnostic Information

To display diagnostic information, enter the following command:

ProCurveRS# debug gvrp packets
GVRP: Packets debugging is on
GVRP: 0x2095ced4: 01 80 c2 00 00 21 00 e0 52 ab 87 40 00 3a 42 42
GVRP: 0x2095cee4: 03 00 01 01 02 00 04 05 00 02 04 05 00 07 04 05
GVRP: 0x2095cef4: 03 00 01 01 02 00 04 05 00 02 04 05 00 07 04 05
GVRP: 0x2095cf04: 03 ec 04 01 03 ef 04 01 03 f1 04 01 05 dd 04 01 09 cb
GVRP: 0x2095cf14: 09 cb 04 01 0f a1 00 00
GVRP: Port 2/1 RCV
GVRP: 0x2095ced4: 01 80 c2 00 00 21 00 e0 52 ab 87 40 00 28 42 42
GVRP: 0x2095cee4: 03 00 01 01 04 02 03 e9 04 01 03 eb 04 01 03 ec
GVRP: 0x2095cef4: 04 01 03 ef 04 01 03 f1 04 01 05 dd 04 01 09 cb
GVRP: 0x2095cf04: 04 01 0f a1 00 00
GVRP: Port 2/1 TX
GVRP: 0x207651b8: 01 80 c2 00 00 01 00 04 80 2c 0e 20 00 3a 42 42
GVRP: 0x207651c8: 03 00 01 01 02 00 04 05 03 e9 04 05 03 eb 04 05
GVRP: 0x207651d8: 03 ec 04 05 03 ef 04 05 03 f1 04 05 05 dd 04 05
GVRP: 0x207651e8: 09 cb 04 05 0f a1 04 02 00 02 04 01 00 07 04 01
GVRP: 0x207651f8: 00 09 04 01 00 0b 00 00
GVRP: Port 2/1 TX
GVRP: 0x207651b8: 01 80 c2 00 00 01 00 04 80 2c 0e 20 00 18 42 42
GVRP: 0x207651c8: 03 00 01 01 04 02 00 02 04 01 00 07 04 01 00 09
GVRP: 0x207651d8: 04 01 00 0b 00 00

Syntax: debug gvrp packets

Clearing GVRP Statistics

To clear the GVRP statistics counters, enter a command such as the following:

ProCurveRS# clear gvrp statistics all

This command clears the counters for all ports. To clear the counters for a specific port only, enter a command such as the following:

ProCurveRS# clear gvrp statistics ethernet 2/1

Syntax: clear gvrp statistics all | ethernet <portnum>

CLI Examples

The following sections show the CLI commands for implementing the applications of GVRP described in “Application Examples” on page 13-1.

NOTE: Although some of the devices in these configuration examples do not have statically configured VLANs, this is not a requirement. You always can have statically configured VLANs on a device that is running GVRP.

Dynamic Core and Fixed Edge

In this configuration, the edge devices advertise their statically configured VLANs to the core device. The core device does not have any statically configured VLANs but learns the VLANs from the edge devices.

Enter the following commands on the core device:

ProCurveRS> enable
ProCurveRS# configure terminal
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable all

These commands globally enable GVRP support and enable the protocol on all ports.

Enter the following commands on edge device A:

ProCurveRS> enable
ProCurveRS# configure terminal
ProCurveRS(config)# vlan 20
ProCurveRS(config-vlan-20)# untag ethernet 2/1
ProCurveRS(config-vlan-20)# tag ethernet 4/24
ProCurveRS(config-vlan-20)# vlan 40
ProCurveRS(config-vlan-40)# untag ethernet 2/1
ProCurveRS(config-vlan-40)# tag ethernet 4/24
ProCurveRS(config-vlan-40)# exit
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable ethernet 4/24
ProCurveRS(config-gvrp)# block-learning ethernet 4/24

These commands statically configure two port-based VLANs, enable GVRP on port 4/24, and block GVRP learning on the port. The device will advertise the VLANs but will not learn VLANs from other devices.

Enter the following commands on edge device B:

ProCurveRS> enable
ProCurveRS# configure terminal
ProCurveRS(config)# vlan 20
ProCurveRS(config-vlan-20)# untag ethernet 2/24
ProCurveRS(config-vlan-20)# tag ethernet 4/1
ProCurveRS(config-vlan-20)# vlan 30
ProCurveRS(config-vlan-30)# untag ethernet 4/24
ProCurveRS(config-vlan-30)# tag ethernet 4/1
ProCurveRS(config-vlan-30)# exit
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable ethernet 4/1
ProCurveRS(config-gvrp)# block-learning ethernet 4/1

Enter the following commands on edge device C:

ProCurveRS> enable
ProCurveRS# configure terminal
ProCurveRS(config)# vlan 30
ProCurveRS(config-vlan-30)# untag ethernet 2/24
ProCurveRS(config-vlan-30)# tag ethernet 4/1
ProCurveRS(config-vlan-20)# vlan 40
ProCurveRS(config-vlan-40)# untag ethernet 4/24
ProCurveRS(config-vlan-40)# tag ethernet 4/1
ProCurveRS(config-vlan-40)# exit
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable ethernet 4/1
ProCurveRS(config-gvrp)# block-learning ethernet 4/1

**Dynamic Core and Dynamic Edge**

In this configuration, the core and edge devices have no statically configured VLANs and are enabled to learn and advertise VLANs. The edge and core devices learn the VLANs configured on the devices in the edge clouds. To enable GVRP on all the ports, enter the following command on each edge device and on the core device.

ProCurveRS> enable
ProCurveRS# configure terminal
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable all
**Fixed Core and Dynamic Edge**

In this configuration, GVRP learning is enabled on the edge devices. The VLANs on the core device are statically configured, and the core device is enabled to advertise its VLANs but not to learn VLANs. The edge devices learn the VLANs from the core.

Enter the following commands on the core device:

```
ProCurveRS> enable
ProCurveRS# configure terminal
ProCurveRS(config)# vlan 20
ProCurveRS(config-vlan-20)# tag ethernet 1/24
ProCurveRS(config-vlan-20)# tag ethernet 6/24
ProCurveRS(config-vlan-20)# vlan 30
ProCurveRS(config-vlan-30)# tag ethernet 6/24
ProCurveRS(config-vlan-30)# tag ethernet 8/17
ProCurveRS(config-vlan-30)# vlan 40
ProCurveRS(config-vlan-40)# tag ethernet 1/5
ProCurveRS(config-vlan-40)# tag ethernet 8/17
ProCurveRS(config-vlan-40)# vlan 50
ProCurveRS(config-vlan-50)# untag ethernet 6/1
ProCurveRS(config-vlan-50)# tag ethernet 1/11
ProCurveRS(config-vlan-50)# exit
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable ethernet 1/24 ethernet 6/24 ethernet 8/17
ProCurveRS(config-gvrp)# block-learning ethernet 1/24 ethernet 6/24 ethernet 8/17
```

These VLAN commands configure VLANs 20, 30, 40, and 50. The GVRP commands enable the protocol on the ports that are connected to the edge devices, and disable VLAN learning on those ports. All the VLANs are advertised by GVRP.

Enter the following commands on edge devices A, B, and C:

```
ProCurveRS> enable
ProCurveRS# configure terminal
ProCurveRS(config)# gvrp-enable
ProCurveRS(config-gvrp)# enable all
ProCurveRS(config-gvrp)# block-applicant all
```

**Fixed Core and Fixed Edge**

The VLANs are statically configured on the core and edge devices. On each edge device, VLAN advertising is enabled but learning is disabled. GVRP is not configured on the core device. This configuration enables the devices in the edge clouds to learn the VLANs configured on the edge devices.

This configuration does not use any GVRP configuration on the core device.

The configuration on the edge device is the same as in “Dynamic Core and Fixed Edge” on page 13-17.