Technical Guide

Generic VLAN Registration Protocol (GVRP)

FEATURE OVERVIEW AND CONFIGURATION GUIDE

Introduction

GVRP enables the automatic VLAN configuration of switches in a network by allowing GVRP enabled switches to dynamically exchange VLAN configuration information with each other.

GVRP is based on GARP, which defines how attributes, like VIDs, are registered and deregistered. This makes it easier to manage VLANs that span more than one switch. Without GVRP, you have to manually configure your switches to ensure that the various parts of the VLANs can communicate with each other across the different switches. With GVRP this is done for you automatically.

The switch uses GVRP Protocol Data Units (PDUs) to share VLAN information among GVRP-active devices. The PDUs contain the VID numbers of all the VLANs on the switch. When the switch receives a GVRP PDU on a port, it examines the PDU to determine the VIDs of the VLANs on the device that sent it. It then does the following:

If the PDU contains a VID of a VLAN that:

- does not exist on the switch, it creates this VLAN and adds the port that received the PDU as a tagged member of the VLAN. A VLAN created by GVRP is called a dynamic GVRP VLAN.
- already exists on the switch but the receiving port is not a member of it, the switch adds the port as a tagged member of the VLAN. A port that has been added by GVRP to a static VLAN (that is a user-created VLAN) is called a dynamic GVRP port.

Only GVRP can modify or delete dynamic GVRP VLANs. Dynamic GVRP VLANs exist only so long as the switch continues to receive GVRP PDUs that contain

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the VID of that VLAN. If there are no more relevant GVRP PDUs arriving, or there are no active links in the VLAN, GVRP deletes it from the switch.

A dynamic GVRP port in a static VLAN remains a member of the VLAN as long as the switch continues to receive GVRP PDUs that contain the VID of that VLAN. If the relevant GVRP PDUs are no longer being received on the port, then GVRP removes the dynamic port from the VLAN, but does not delete the VLAN if it is a static VLAN, (i.e. not a VLAN created by GVRP).

Products and software version that apply to this guide

This guide applies to AlliedWare Plus™ products that support GVRP, running version **5.4.1** or later.

To see whether your product supports GVRP, see the following documents:

- The product's Datasheet
- The AlliedWare Plus Datasheet
- The product's Command Reference

These documents are available from the above links on our website at alliedtelesis.com.

Feature support may change in later software versions. For the latest information, see the above documents.

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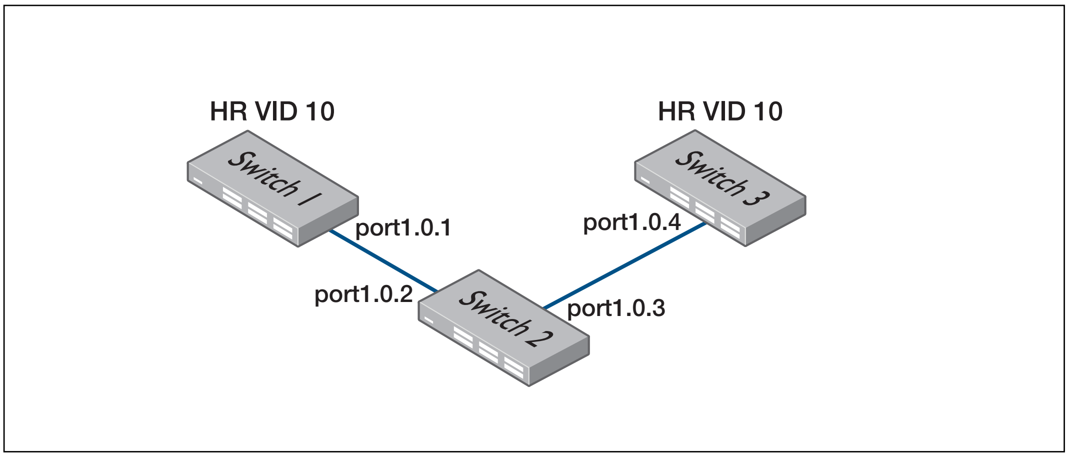
GVRP Example

This example consists of three switches. Switch 1 and Switch 3 have VLAN 10, the Human Resources (HR) VLAN. Switch 2 is not configured with the HR VLAN 10. Consequently, the end nodes of the two parts of the HR VLAN 10 cannot communicate with each other because Switch 2 does not have VLAN 10.



Without GVRP, you would have to manually add the HR VLAN 10 to Switch 2. But with GVRP, the VLAN is added automatically. Here is how GVRP resolves this example.

1. Interface **port1.0.1** on Switch 1 sends a PDU (Protocol Data Unit) to interface **port1.0.2** on Switch 2 that contains the VIDs of all the VLANs on Switch 1, including VID 10 for the HR VLAN.
2. Switch 2 examines the PDU it receives on interface **port1.0.2** and finds that it does not have a VLAN with a VID 10. In response, it creates the VLAN as a dynamic GVRP VLAN, assigning it VID 10. Switch 2 then adds interface **port1.0.2**, the switch port that received the PDU, as a tagged member of HR VLAN 10.
3. Switch 2 sends a PDU from interface **port1.0.3** containing all the VIDs of the VLANs on the switch, including the new VID 10. Note at this point interface **port1.0.3** is not a member of VLAN 10. Ports are added to VLANs when they receive PDUs from other switches in the network, not when they transmit PDUs.
4. Switch 3 receives the PDU on interface **port1.0.4** and, after examining it, finds that one of the VLANs on Switch 2 has the VID 10, which matches the VID of an already existing VLAN on the switch. So it does not create the VLAN because it already exists. It then determines whether the port that received the PDU, in this case interface **port1.0.4**, is a member of the VLAN. If it is not a member, it adds the port to the VLAN as a tagged dynamic GVRP port. If the port is already a member of the VLAN, then no change is made.
5. Switch 3 sends a PDU out interface **port1.0.4** to interface **port1.0.3** on Switch 2.
6. Switch 2 receives the PDU on interface **port1.0.3** and then adds the port as a tagged dynamic GVRP port to the dynamic GVRP VLAN 10.

There is now a communications path for the end nodes of the HR VLAN 10 connected to Switch 1 and Switch 3. GVRP created the new dynamic GVRP VLAN with a VID of 10 on Switch 2 and added interfaces **port1.0.2** and **port1.0.3** to HR VLAN 10 as tagged dynamic GVRP ports.

GVRP Guidelines

Here are the guidelines for configuring GVRP on your switch:

- All ports that constitute a network link between the switch and the other switches must be running GVRP.
- You cannot modify or delete dynamic GVRP VLANs.
- You cannot remove dynamic GVRP ports from static or dynamic VLANs.
- There is a limit of 400 VLANs supported by the AlliedWare Plus GVRP implementation. VLANs may be numbered anywhere within the range 1-4094.
- MSTP is not supported by the current AlliedWare Plus GVRP implementation. GVRP and MSTP are mutually exclusive. STP and RSTP are supported by GVRP.
- VCStack™ is not supported by the current AlliedWare Plus GVRP implementation.
- To be detected by GVRP, a VLAN must have at least one active port. GVRP cannot detect a VLAN that does not have any active nodes or valid port links.
- Rebooting the switch erases all dynamic GVRP VLANs and dynamic GVRP port assignments. The dynamic assignments are relearned by the switch as PDUs arrive on the ports from other switches.
- GVRP has three timers: join, leave, and leave all timers. The values for these timers must be set the same on all switches running GVRP. Timers with different values on different switches can result in GVRP compatibility issues.
- You can convert dynamic GVRP VLANs and dynamic GVRP port assignments to static VLANs and static port assignments.
- The default port settings on the switch for GVRP is inactive, meaning that the ports will not participate in GVRP until enabled on the switch globally and on the interface locally.
- Allied Telesis recommends disabling GVRP on those ports that are connected to GVRP-inactive devices, meaning any switches that do not have the GVRP feature enabled.
- PDUs are transmitted from only those switch ports where GVRP is enabled.
- Private VLAN trunk ports are not supported by the current AlliedWare Plus GVRP implementation. GVRP and private VLAN trunk ports are mutually exclusive.

GVRP and network security

GVRP should be used with caution because it can expose your network to unauthorized access. If a network intruder were to connect to a switch port running GVRP and transmit a bogus GVRP PDU containing VIDs of restricted VLANs, GVRP would make the port a member of the VLANs, giving the intruder access to restricted areas of your network.

Here are a few suggestions to protect against this type of unauthorized network intrusion:

- Activating GVRP only on those switch ports connected to other GVRP devices. Do not activate GVRP on ports that are connected to GVRP inactive devices.
- Converting all dynamic GVRP VLANs and dynamic GVRP ports to static assignments, and then turning off GVRP on all the switches. This preserves the new VLAN assignments while protecting against unauthorized network intrusion.

GVRP-inactive intermediate switches

If two GVRP-active devices are separated by a GVRP-inactive switch, the GVRP-active devices may not be able to share VLAN information. There are two issues involved.

The first is whether the intermediate switch forwards the GVRP PDUs that it receives from the GVRP-active switches. GVRP PDUs are management frames, intended for the switch's CPU. In all likelihood, a GVRP-inactive switch will discard the PDUs because it will not recognize them.

The second issue is that even if a GVRP-inactive switch forwards GVRP PDUs, it will not automatically create the VLANs. Consequently, even if GVRP-active switches receive the PDUs and create the necessary VLANs, an intermediate switch may block the VLAN traffic, unless you modify its VLANs and port assignments manually.

Enabling GVRP on the switch

The command for enabling GVRP on the switch is found in the Global Configuration mode. It is the **gvrp enable (global)** command. After the command is entered, the switch immediately begins to transmit PDUs from those ports where GVRP is enabled. Further, to enable the switch to create dynamic VLANs if it receives GVRP PDUs that contain VIDs for VLANs it does not currently have, use the command **gvrp dynamic-vlan-creation**.

Here are the commands to enable GVRP on the switch and enable to switch to create dynamic VLANs if it receives GVRP PDUs that contain VIDs for VLANs it does not currently have:

```
awplus>enable
awplus#configure terminal
awplus(config)#gvrp enable
awplus(config)#gvrp dynamic-vlan-creation
```

For more information, refer to the **gvrp enable (global)** and the **gvrp dynamic-vlan-creation** commands in the Command Reference.

Enabling GVRP on the ports

To activate GVRP on the ports so that they transmit GVRP PDUs, use the **gvrp registration** and the **gvrp (interface)** commands in the Interface Configuration mode. Because the default setting for GVRP on the ports is disabled, you need to use these commands if you want to re-enable GVRP after disabling it on a port.

This example of these commands activates GVRP on interface **port1.0.4**, **port1.0.5**, and **port1.0.6**:

```
awplus>enable
awplus#configure terminal
awplus(config)#interface port1.0.4,port1.0.5,port1.0.6
awplus(config-if)#gvrp registration normal
awplus(config-if)#gvrp
```

For reference information, refer to the **gvrp registration** and **gvrp (interface)** commands in the Command Reference.

Setting the GVRP timers

The switch has a join timer, a leave timer, and a leaveall timer. You should not change the timers unless you understand their functions. (Refer to the IEEE 802.1p standard for the timer definitions.) The timers have to be set the same on all GARP-active network devices and the join timer and the leave timer have to be set according to the following rule:

leave timer >= (3 x (join timer))

When configuring the leave timer, set it to more than or equal to three times the join timer value. The settings for the leave and join timers must be the same for all GVRP enabled switches.

The commands for setting the timers are in the Interface Configuration mode. They are:

- **gvrp timer join**
- **gvrp timer leave**
- **gvrp timer leaveall**

The timers are set in one hundredths of a second. This example sets the join timer to 0.2 seconds, the leave timer to 0.8 seconds and the leaveall timer to 10 seconds for port1.0.2.

```
awplus>enable
awplus#configure terminal
awplus(config)#interface port1.0.2
awplus(config-if)#gvrp timer join 20
awplus(config-if)#gvrp timer leave 80
awplus(config-if)#gvrp timer leaveall 1000
```

Disabling GVRP on the ports

To disable GVRP on the ports, use the **gvrp registration none** and **no gvrp (interface)** commands in the Interface Configuration mode.

This example of the command deactivates GVRP on interfaces **port1.0.4** and **port1.0.5**:

```
awplus>enable
awplus#configure terminal
awplus(config)#interface port1.0.4,port1.0.5
awplus(config-if)#gvrp registration none
awplus(config-if)#no gvrp
```

For reference information, refer to the **gvrp registration** and **gvrp (interface)** commands in the Command Reference.

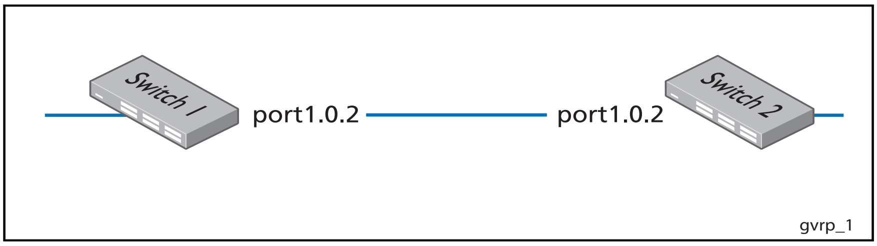
Disabling GVRP on the switch

To disable GVRP to stop the switch from learning any further dynamic VLANs or GVRP ports, use the **no gvrp (interface) enable** command in the Global Configuration mode.

```
awplus>enable
awplus#configure terminal
awplus(config)#no gvrp enable
```

Configuring and Validating GVRP

GVRP allows the exchange of VLAN information between switches in a network. If one switch is manually configured with multiple VLANs, other switches in the network learn about these VLANs dynamically through GVRP.



Switch 1: Configuring GVRP to receive VLANs from Switch 1

`awplus#`
`configure terminal`
	Enter the **Global Configuration** mode from the **Privileged Exec** mode.

`awplus(config)#`
`gvrp enable`
	Enter GVRP on **Switch 1**.

`awplus(config)#`
`gvrp dynamic-vlan-creation`
	Enable dynamic VLAN creation for GVRP. Note that GVRP is now enabled globally for **Switch 1**.

`awplus(config)#`
`interface port1.0.2`
	Specify an interface (**port1.0.2**) to be configured and enter **Interface Configuration** mode.

`awplus(config-if)#`
`switchport mode trunk`
	Set the switching characteristics of the interface as trunk and specify tagged frames only. Any frames not tagged as trunk frames are discarded.

`awplus(config-if)#`
`switchport trunk allowed vlan all`
	Apply to all VLANs on this interface.

`awplus(config-if)#`
`gvrp`
	Enable GVRP on switch port **port1.0.2**.
	Note that GVRP is now set up on interface **port1.0.2** as GVRP is also enabled globally for **Switch 1**.

`awplus(config-if)#`
`exit`
	Exit **Interface Configuration** mode and enter **Global Configuration** mode.

`awplus(config)#`
`exit`
	Exit **Global Configuration** mode and enter **Privileged Exec** mode.

`awplus#`
`show gvrp configuration`
	Show GVRP configuration on **Switch 1** to confirm GVRP is ready to propagate VLANs.

Switch 2: Configuring GVRP and creating VLANs to propagate:

awplus# enable	Enter the **Privileged Exec** mode.
awplus# configure terminal	Enter the **Global Configuration** mode.
awplus(config)# gvrp enable	Enter GVRP on **Switch 2**.
awplus(config)# vlan database	Create VLANs to propagate between **Switch 1** and **Switch 2** with GVRP enabled on the Switches and on the interfaces on each Switch.
awplus(config-vlan)# vlan 20-30	Create 11 VLANs with VIDs 20 through 30 to propagate between interface **port1.0.2** on **Switch 1** and **Switch 2**.
awplus(config)# gvrp dynamic-vlan-creation	Enable dynamic VLAN creation for GVRP. Note that GVRP is now enabled globally for **Switch 2**.
awplus(config)# interface port1.0.2	Specify an interface (**port1.0.2**) to be configured and enter **Interface Configuration** mode.
awplus(config-if)# switchport mode trunk	Set the switching characteristics of the interface as trunk and specify tagged frames only. Any frames not tagged as trunk frames are discarded.
awplus(config-if)# switchport trunk allowed vlan all	Set this interface to be a tagged member of all VLANs.
awplus(config-if)# gvrp	Enable GVRP on switch port **port1.0.2**.
awplus(config-if)# exit	Exit **Interface Configuration** mode and enter **Global Configuration** mode.
awplus(config)# exit	Exit **Global Configuration** mode and enter **Privileged Exec** mode.
awplus# show gvrp configuration	Show GVRP configuration on **Switch 2** to confirm GVRP is ready to propagate VLANs.

Switch 1: Validating VLANs have propagated from Switch 2:

awplus# show vlan	Confirm the VLANs are available from **Switch 2** on **Switch 1** by examining show output to confirm VLANs from **Switch 2** are on **Switch 1**.