POSITRON
Access Solutions

GAM VLAN Configuration Guide

August 18, 2024

Contents

1. Summary

Positron GAM is a layer 2 network hardware that allows the transport of VLANs over existing coax or copper twisted pairs. The present document explains in a few steps the provisioning of VLANs in the GAM (Coax or Copper) and the Subscriber to provide L2 end-to-end connectivity.

2. GAM Solution Diagram

Figure 1 shows a typical topology of a GAM solution over coax or copper twisted pairs. The GAM is connected to the network backbone through the 10G port where VLANs are received and mapped to the Subscribers on the Endpoint side.

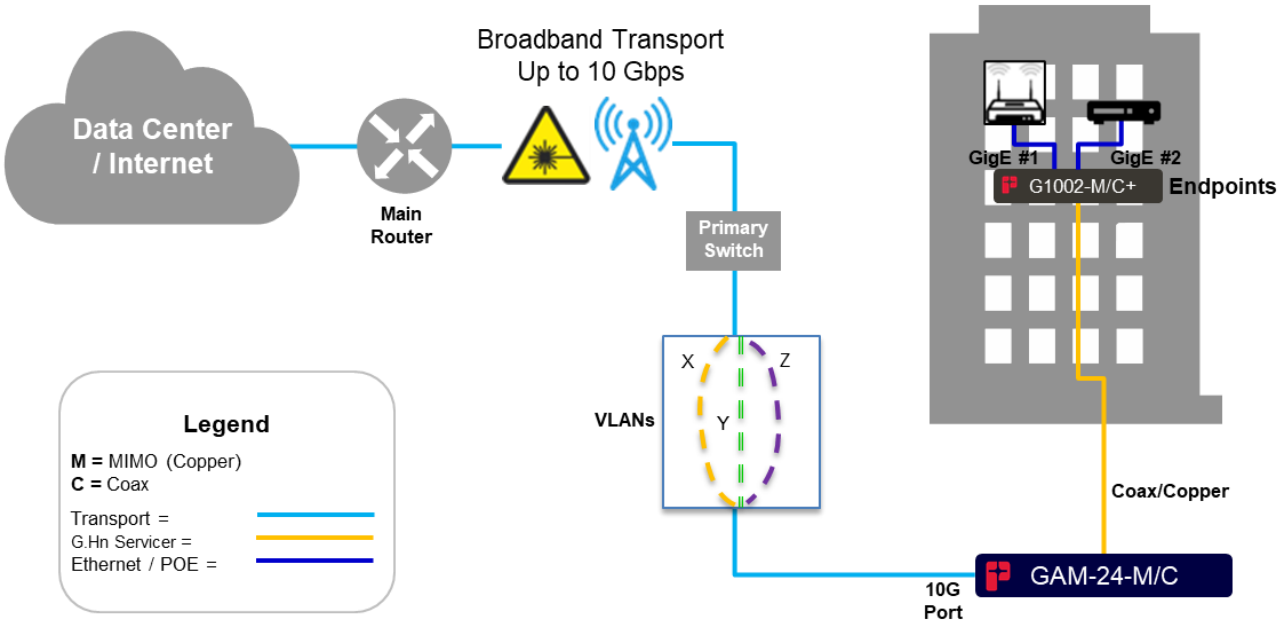


Figure 1 *GAM Solution diagram*

3. GAM 10G Port Configuration

Before adding VLANs it is necessary to set **Speed** and **Mode** on 10G port of the GAM at **Configuration→Ports (Ethernet)** as shown in figure below**.** If GPON SFP adapter is installed in the GAM, it is recommended to select **Auto** Speed option to make it link to 1 Gbps or 2.5 Gbps if available. **Auto** option works with 1 Gbps and 2,5 Gbps links only.
When using XGS-PON SFP+ adapter **10 Gbps FDX** option shall be selected.
Port **Mode** is set to **Uplink** by default, it means that traffic flows to/from all other ports (isolated, community and stacking ports).

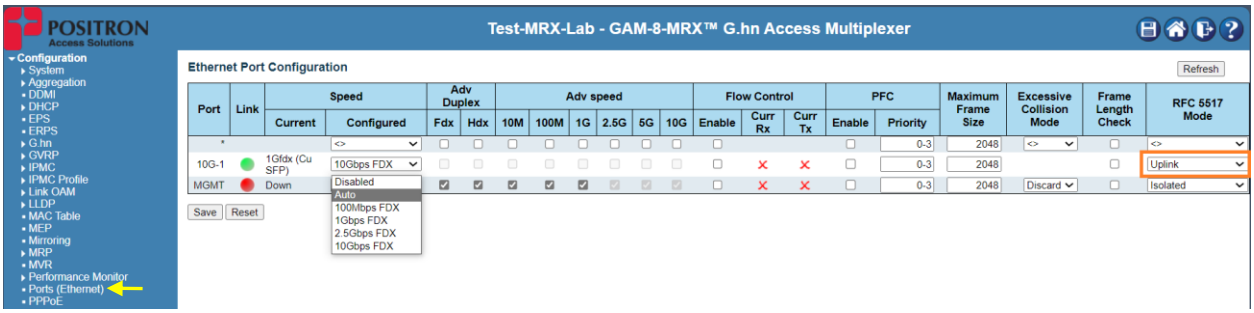


Figure 2 *GAM 10G Port configuration*

4. GAM 10G Port VLAN Configuration

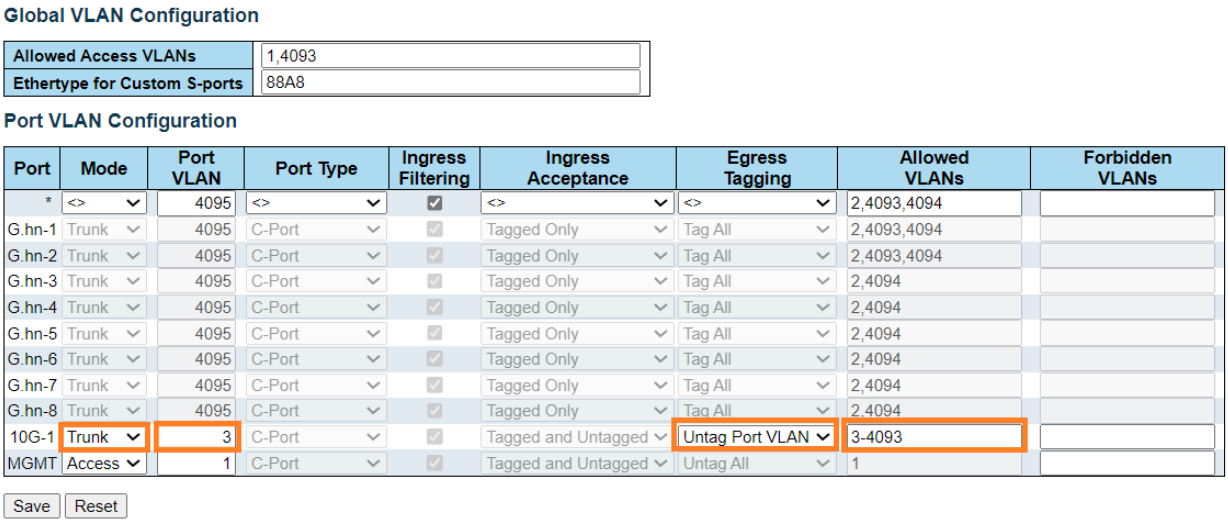
Once 10G port is configured we can proceed with the provisioning of VLANs, one or multiple VLANs can be configured on 10G port of the GAM, GAM VLAN settings must match with the configuration of the primary switch connected to it.

In this section we show three typical ways to set VLANs on 10G port of the GAM that is facing the Primary Switch:

a. **One Untagged VLAN + Tagged VLANs:** 10G port of the GAM has an untagged VLAN attached to it (native VLAN) and additionally will transport some other tagged VLANs as a Trunk port at the same time.
b. **All VLANs Tagged:** 10G port of the GAM transport tagged VLAN only as a Trunk port.
c. **Access mode:** 10G port of the GAM works as an access port with an internal VLAN ID assigned to it.

3.1 Untagged VLAN + Tagged VLANs

For this case it is assumed that 10G port of the GAM will be connected to a switch to receive one untagged VLAN + one or multiple tagged VLANs.
It is required to go to **Configuration→VLANs→Configuration** to set Port 10G of the GAM to **Trunk** Mode as shown in ***Figure 3*****,** it means that 10G port can have more than one VLAN assigned, **Egress Tagging** must be set to **Untag Port VLAN** to assign VLAN ID 3 (used for this example) on column **Port VLAN** as the untagged "native" VLAN. **Allowed VLANs** field is where we specify the list or ranges of Tagged VLANs allowed on the 10G port. To enter a range of VLANs a dash "-" is written between the first and last VLAN of the range i.e. *3-4093* (means from 3 up to 4094), it is also possible to specify a few VLANs i.e. *3,200,250,3000,4000* with a maximum of 12 entries separated with commas "',". We can also have a combination of ranges of VLANS with single VLANs i.e. *3,200-204,250,3000,4000.*
Summary: With settings shown in ***Figure 3*** we have VLAN 3 as Untagged VLAN on port 10G-1 and allowing VLAN range from 3 to 4093 to pass through 10G-1 port as tagged VLANs.



Global VLAN Configuration

Allowed Access VLANs	1,4093
Ethertype for Custom S-ports	88A8

Port VLAN Configuration

Port	Mode	Port VLAN	Port Type	Ingress Filtering	Ingress Acceptance	Egress Tagging	Allowed VLANs	Forbidden VLANs
*	<>	4095	<>	☑	<>	<>	2,4093,4094	
G.hn-1	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4093,4094	
G.hn-2	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4093,4094	
G.hn-3	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-4	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-5	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-6	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-7	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-8	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
10G-1	Trunk	3	C-Port	☑	Tagged and Untagged	Untag Port VLAN	3-4093	
MGMT	Access	1	C-Port	☑	Tagged and Untagged	Untag All	1	

Save Reset

Figure 3 *Settings on 10G port Untagged VLAN and Tagged VLANs*

3.2 All VLANs Tagged

For this case it is assumed that 10G port of the GAM will be connected to a switch to receive one or multiple tagged VLANs.
It is required to go to **Configuration→VLANs→Configuration** to set Port 10G of the GAM to **Trunk** Mode as shown in ***Figure 4*****,** it means that 10G port can have more than one VLAN assigned, **Egress Tagging** must be set to **Tag All,** it means that Port 10G will expect tagged VLAN only, then VLAN ID 3 (used for this example) on column **Port VLAN** will be ignored. **Allowed VLANs** field is where we specify the list or ranges of Tagged VLANs allowed on the 10G port. To enter a range of VLANs a dash "-" is written between the first and last VLAN of the range i.e. *3-4094* (means from 3 up to 4094), it is also possible to specify a few VLANs i.e. *3,200,250,3000,4000* with a maximum of 12 entries separated with commas "',". We can also have a combination of ranges of VLANS with single VLANs i.e. *3,200-204,250,3000,4000.*

Summary: With settings shown in ***Figure 4*** we are ignoring VLAN 3 as Untagged VLAN on port 10G-1 and allowing VLAN range from 3 to 4093 to pass through 10G-1 port as tagged VLANs.

Global VLAN Configuration

Allowed Access VLANs	1,4093
Ethertype for Custom S-ports	88A8

Port VLAN Configuration

Port	Mode	Port VLAN	Port Type	Ingress Filtering	Ingress Acceptance	Egress Tagging	Allowed VLANs	Forbidden VLANs
*	<>	4095	<>	☑	<>	<>	2,4093,4094	
G.hn-1	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4093,4094	
G.hn-2	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4093,4094	
G.hn-3	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-4	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-5	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-6	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-7	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-8	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
10G-1	Trunk	3	C-Port	☑	Tagged Only	Tag All	3-4093	
MGMT	Access	1	C-Port	☑	Tagged and Untagged	Untag All	1	

Save Reset

Figure 4 *Settings on 10G port for Tagged VLANs only*

3.3 Access mode

For this case it is assumed that 10G port of the GAM will be connected to an access port of a switch or to a host.

It is required to go to **Configuration→VLANs→Configuration** to set Port 10G of the GAM to **Access Mode** as shown in ***Figure 5*****,** it means that 10G port has a single untagged VLAN, **Egress Tagging** and **Allowed VLANs** will be grayed out. It is required to add VLAN ID (VLAN 3 used for this example) on column **Port VLAN,** it will be the VLAN ID assigned internally to 10G port and this same VLAN ID will be used to map traffic in Subscribers, additionally we need to enter VLAN ID in **Allowed Access VLANs**.

Summary: With these settings port 10G-1 will work as an access port using **Port VLAN** (VLAN 3) internally, we can use VLAN ID 3 in any subscriber to map the traffic from 10G port to an Endpoint at customer side.

Global VLAN Configuration

Allowed Access VLANs	1,3
Ethertype for Custom S-ports	88A8

Port VLAN Configuration

Port	Mode	Port VLAN	Port Type	Ingress Filtering	Ingress Acceptance	Egress Tagging	Allowed VLANs	Forbidden VLANs
*	<>	4095	<>	☑	<>	<>	2,4093,4094	
G.hn-1	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4093,4094	
G.hn-2	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4093,4094	
G.hn-3	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-4	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-5	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-6	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-7	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
G.hn-8	Trunk	4095	C-Port	☑	Tagged Only	Tag All	2,4094	
10G-1	Access	3	C-Port	☑	Tagged and Untagged	Untag All	3	
MGMT	Access	1	C-Port	☑	Tagged and Untagged	Untag All	1	

Save Reset

Figure 5 *Settings on 10G port for Access Mode*

5. Subscriber VLAN Configuration

Once the VLANs are set in 10G port of the GAM it is necessary to set the VLANs on the Endpoint side at the Subscriber.

Figure 6 shows Subscriber configuration page located at **Configuration→G.hn→Subscriber**, in this example Endpoint is delivering VLAN 150 untagged in port GigE #1 and allowing tagged VLANs 1000, 2000 and 3000 over the same port GigE #1. These VLANs must be included in the Allowed VLANs list on 10G port.

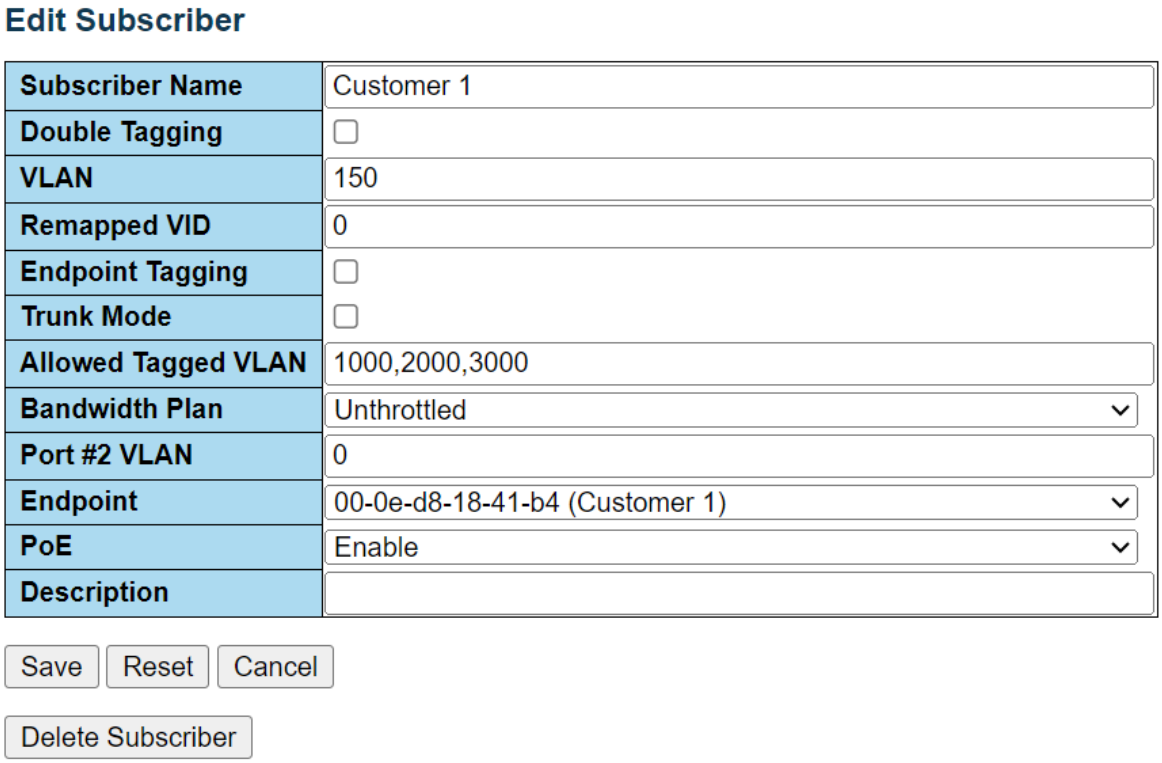


Figure 6 *Subscriber configuration page*

Subscriber Name: This field is mandatory; the name must be unique among all subscribers and It must contain between 1 and 31 characters.
Double Tagging: Enable 802.1ad QinQ double tagging.
VLAN: Is the main VLAN used to carry the subscriber traffic to port GigE #1 of the Endpoint, by default this VLAN is untagged, if we want it to be tagged, it is necessary to select **Endpoint Tagging** flag. Valid values are 0 (disabled) and 3 to 4095.
Remapped VID: If defined, this is the VLAN ID (C-TAG) used between the G.hn bridge (Endpoint) and the GAM
Endpoint Tagging: Enable or disable VLAN tag (C-TAG) at the subscriber endpoint. If disabled, the traffic will be untagged at the subscriber end. If enabled, the VLAN tag will be kept (either the primary VLAN tag, or if set, the remapped VLAN tag).

Trunk Mode: Set port GigE #1 in trunk mode assuming VLAN range 3-4093 removing **Allowing Tagged VLAN** option from the menu.
Allowed Tagged VLAN: Additional VLANs that are allowed in port GigE #1 of the Endpoint. Those VLAN will remain tagged. Note that there is no link between this field and the main VLAN field for this subscriber (the main VLAN will be used, and untagged, whatever the content of this field).
Multiple VLANs may be created by using a list syntax where the individual elements are separated by commas. Ranges are specified with a dash separating the lower and upper bound.
The following example will create VLANs 3, 10, 11, 12, 13, 200, and 300: 3,10-13,200,300. Spaces are allowed in between the delimiters.
Allowed VLANs must be in range 3 to 4093. You can enter up to 12 VLAN IDs.
Bandwidth Plan: Is the bandwidth plan selected for the Endpoint in port GigE #1. If set to "Unthrottled", this subscriber will have no bandwidth limit restriction.
Port #2 VLAN: Is the VLAN assigned to port GigE #2 of the Endpoint, this VLAN will be untagged only.
Endpoint: The Endpoint assigned to this subscriber.
PoE: Configure the PoE mode for the Endpoint in port GigE #1, this feature is available only in G1002-C+, G1002-M+ and G2002-M+ Endpoints.
Description: An optional free-form description given to this subscriber.