



Reimagine MDU/MTU High Speed Broadband

IGAM – G.hn Access Multiplexer

Quick Start Guide

June 2022

Agenda

- Connecting to the GAM
 - G.hn Monitoring
 - Configure G.hn Services
 - Configure the Ethernet port (Uplink)
 - Configure WAN VLAN (Uplink)
 - Configure the System
 - Configure Security
 - Troubleshooting/Diagnostic G.hn
 - Maintenance
- Extras
- IGMP snooping (IP multicast)
 - DHCP snooping

Connecting to the GAM

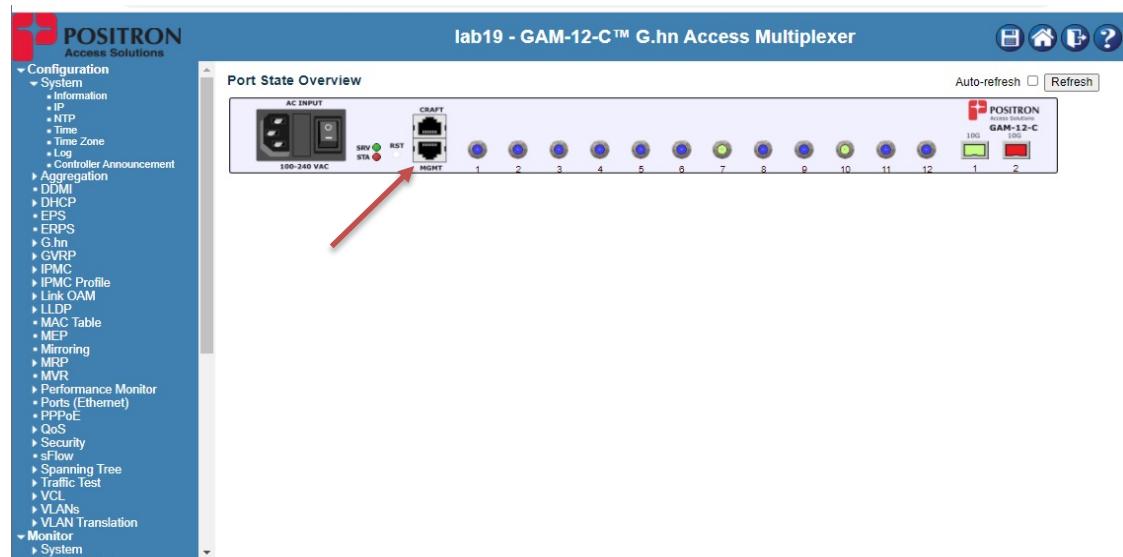


1. Via Web/Ethernet

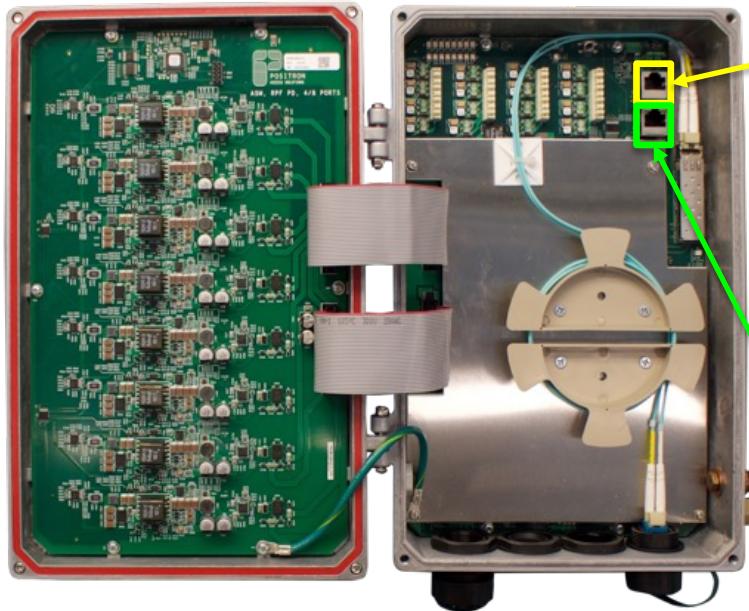
- Connect Ethernet cable from laptop/PC to the MGMT port on GAM (see [GAM Management ports](#))
- Set Ethernet port on Laptop/PC to IP: 192.168.10.2
- MGMT port on GAM is
 - Ethernet
 - IP address 192.168.10.1
 - User: admin
 - Password: <blank>

2. Via serial/CRAFT port on the GAM

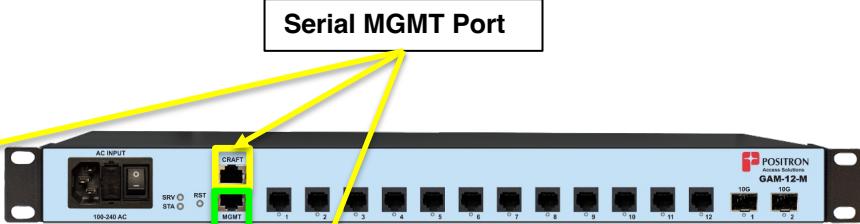
- Serial 115200 8, N, 1
- User: admin
- Password: <blank>
- A Cisco console cable will work



GAM Management ports



Outdoor GAM



Serial MGMT Port

Ethernet MGMT Port

Indoor GAM

Monitoring G.hn service



1. Monitor G.hn services

- Monitor → G.hn → overview. This menu will give you an overview of the endpoints connected to the GAM. Discovered endpoints or configured endpoints

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Auto-refresh Refresh

GAM										Endpoint				Subscriber			
Port	Name	Status	MAC Address	Role	RFC 5517	Allowed VLAN	Forbidden VLAN	Number of Endpoints	+ Status	MAC Address	Name	Model	Uplink Port	S-VLAN (Outer Tag)	C-VLAN (Inner Tag)	Bandwidth Plan	
G.hn-1		●	00-0e-d8-13-05-30	Domain Master	Isolated	3840-3844		0									
G.hn-2		●	00-0e-d8-13-05-31	Domain Master	Isolated	3840-3844		0									
G.hn-3		●	00-0e-d8-13-05-32	Domain Master	Isolated	3840-3844		0									
G.hn-4		●	00-0e-d8-13-05-33	Domain Master	Isolated	3840-3844		0									
G.hn-5		●	00-0e-d8-13-05-34	Domain Master	Isolated	3840-3844		0									
G.hn-6		●	00-0e-d8-13-05-35	Domain Master	Isolated	3840-3844		0									
G.hn-7		●	00-0e-d8-13-05-36	Domain Master	Isolated	3840-3844		1	+								
G.hn-8		●	00-0e-d8-13-05-37	Domain Master	Isolated	3840-3844		0									
G.hn-9		●	00-0e-d8-13-05-38	Domain Master	Isolated	3840-3844		0									
G.hn-10		●	00-0e-d8-13-05-39	Domain Master	Isolated	3840-3844		1	+								
G.hn-11		●	00-0e-d8-13-05-3a	Domain Master	Isolated	3840-3844		0									
G.hn-12		●	00-0e-d8-13-05-3b	Domain Master	Isolated	3840-3844		0									

POSITRON Access Solutions

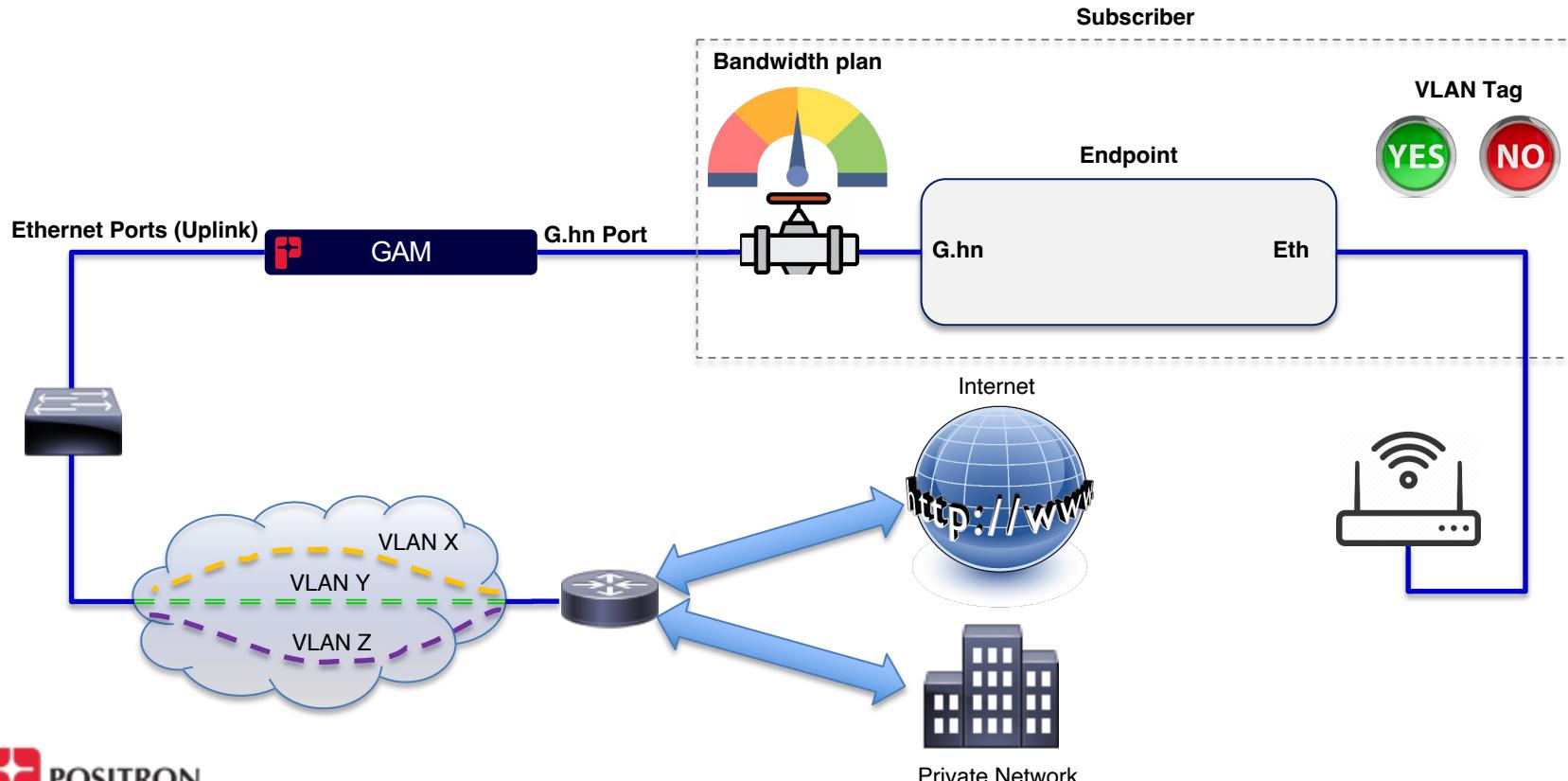
Configure G.hn services



1. Configure G.hn services

- a. **Configure bandwidth plan.** These are rate limiters that can be applied to each subscriber. This is optional, a subscriber can be set to “Unthrottled” and will get the maximum bandwidth available.
 - i. Add 6% to the rate for TCP overhead
- b. **Configure endpoints.** This is the physical bridge (G1000/G1001) installed in the apartment. Click “add new endpoint”, if the MAC is in the discovered table, just click on the MAC, or type the MAC. The name is mandatory, the description is a friendly name optional.
- c. **Configure g.hn ports.** In copper (twisted pair), the port is set in MIMO mode (2-pair), if only one pair is available to the apartment, you need to change the port to SISO mode (1-pair). For coax just activate the port
- d. **Configure a subscriber.** The subscriber is the service, it is connected to a VLAN, an endpoint and associated to a bandwidth profile. By default, the traffic on the subscriber side will be untag. There is option to keep the tag and allow other vlan to pass through.
 - Note: you can assign unique vlan per subscriber or reuse the same vlan for all subscribers, the GAM supports port isolation, traffic will be isolated.

GAM G.hn services overall diagram



Config Bandwidth Profiles



Conf → G.hn → Bandwidth Profile → Add New Bandwidth Plan

a. **Configure bandwidth plan.** These are rate limiters that can be applied to each subscriber.

This is optional, a subscriber can be set to “Unthrottled” and will get the maximum bandwidth available. Add 6% to the rate for TCP overhead

The screenshot shows the POSITRON Access Solutions software interface. On the left, there is a navigation tree with the following structure:

- Configuration
 - System
 - Aggregation
 - DDMI
 - DHCP
 - EPS
 - ERPS
 - G.hn
 - Bandwidth Profile
 - Endpoints
 - Global Configuration
 - Ports
 - Power Mask
 - Subscribers
- GVRP
- IPMC
- IPMC Profile
- Link OAM
- LLDP
- MAC Table
- MEP
- Mirroring
- MRP
- MVR
- Performance Monitor
 - Ports (Ethernet)
 - PPPoE
- QoS
- Security
 - sFlow
- Spanning Tree
- Traffic Test

A red arrow points from the 'G.hn' node in the navigation tree to the 'G.hn Bandwidth Plans Configuration' table. Another red arrow points from the 'Add New Bandwidth Plan' button at the bottom of the table to the table itself. The table displays the following data:

ID	Name	Downstream Bandwidth	Upstream Bandwidth	Description
1	Default BW Profile	10 Mbit/s	10 Mbit/s	Basic service
2	15/15	15 Mbit/s	15 Mbit/s	
3	30/30	30 Mbit/s	30 Mbit/s	Silver
4	50/50	50 Mbit/s	50 Mbit/s	Gold
5	100/100	100 Mbit/s	100 Mbit/s	Blast

Configure Endpoints



- b. **Configure endpoints.** This is the physical bridge (G1000/G1001) installed in the apartment. Click “add new endpoint”, if the MAC is in the discovered table, just click on the MAC, or type the MAC. The name is mandatory, the description is a friendly name optional.

*Conf→G.hn→Endpoints→Add new endpoint

Before

The screenshot shows the POSITRON Access Solutions software interface. The left sidebar has a red arrow pointing to the 'Configuration' section, which includes 'System', 'Aggregation', 'DDMI', 'DHCP', 'EPS', 'ERPS', and 'G.hn'. A red arrow points to the 'Endpoints' item under 'G.hn'. Another red arrow points to the 'Add New Endpoint' button at the bottom of the 'Discovered but unconfigured endpoints' table. The table lists two entries: '00-0e-d8-13-08-3a' and '00-0e-d8-13-08-40'. The interface title is 'lab19 - GAM-12-C™ G.hn Access'.

After

The screenshot shows the same software interface after configuration. The 'G.hn' section of the sidebar now includes 'Bandwidth Profile', 'Ports', 'Power Mask', and 'Subscribers'. The 'Add New Endpoint' button is still present at the bottom of the table. The table now contains two rows with additional columns: 'Name' and 'Description'. The first row is for '00-0e-d8-13-08-3a' with 'Name: Positron_13083A' and 'Description: Basic service- Bldg 5 Apt 201'. The second row is for '00-0e-d8-13-08-40' with 'Name: Positron_130840' and 'Description: Gold-Bldg 10 Apt 501'. The interface title is 'lab19 - GAM-12-C™ G.hn Access'.

Config G.hn ports



- c. **Configure G.hn ports.** In copper (twisted pair), the port is set in MIMO mode (2-pair), if only one pair is available to the apartment you need to change the port to SISO mode (1-pair). For coax just activate the port. The GAM supports port isolation, traffic will be isolated.

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G.hn Ports Configuration

Port	Name	Status	Enable	Role	RFC 5517 Mode	RFC 5517 Community	Aggregation Group	Allowed VLAN	
*			<input checked="" type="checkbox"/>	<>	<>				
G.hn-1		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-2		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-3		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-4		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-5		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-6		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-7	Basic Bldg 5 apt 201	●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-8		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-9		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-10	Gold Bldg 10 apt 501	●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-11		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3
G.hn-12		●	<input checked="" type="checkbox"/>	Domain Master	Isolated	1	-	2,4094	3

Configure Subscribers



- d. **Configure a subscriber.** The subscriber is the service, it is connected to a VLAN, an endpoint and a bandwidth profile. By default, the traffic on the subscriber side will be untag. There is option to keep the tag and allow other vlan to pass through.
- Note: you can assign unique vlan per subscriber or reuse the same vlan for all subscribers,

Step 1

G.hn Subscribers Configuration										
Id	Subscriber Name	Uplink Port	S-VLAN (Outer Tag)	C-VLAN (Inner Tag)	Remapped VID	Endpoint Tagging	Allowed Tagged VLANs	Bandwidth Plan	Port #2 VLAN	EI
No subscribers defined										

Step 2



Configuration
▪ System
▪ Aggregation
▪ DDMI
▪ DHCP
▪ EPS
▪ ERPS
▪ G.hn
▪ Bandwidth Profile
▪ Endpoints
▪ Global Configuration
▪ Ports
▪ Power Mask
▪ Subscribers
▪ IPRM
▪ IPMC
▪ Link OAM
▪ LLDP
▪ MAC Table
▪ MEP

lab19 - GAM-12-C™ G.hn

Subscriber Name	Positron_130840-P10
Double Tagging	<input type="checkbox"/>
VLAN	4
Remapped VID	0
Endpoint Tagging	<input type="checkbox"/>
Trunk Mode	<input type="checkbox"/>
Allowed Tagged VLAN	30/30
Bandwidth Plan	30/30
Port #2 VLAN	0
Endpoint	00-0e-d8-13-08-40 (Positron_130840)
Description	Gold-Bldg 10 Apt 501

Final step

G.hn Subscribers Configuration										
Id	Subscriber Name	Uplink Port	S-VLAN (Outer Tag)	C-VLAN (Inner Tag)	Remapped VID	Endpoint Tagging	Allowed Tagged VLANs	Bandwidth Plan	Port #2 VLAN	Endpoint
1	Positron_130840-P10	-	4	-	-	Untagged	-	30/30	-	00-0e-d8-13-08-40 (Positron_130840)

Config Ethernet Ports (Uplink)



1. Configure Ethernet Ports (Uplink)

- Port (Ethernet). The 10G SFP is set for “10G FDX” and will link up automatically most of 10G or 1G SFP. Sometime with some copper 1G SFP, the link will not come up, in this case change the “auto”

Port	Link	Speed		Adv Duplex		Adv speed						Flow Control			PFC		Maximum Frame Size	Excessive Collision Mode	Frame Length Check
		Current	Configured	Fdx	Hdx	10M	100M	1G	2.5G	5G	10G	Enable	Curr Rx	Curr Tx	Enable	Priority			
10G-1	1Gbps (Cu SFP)	1Gbps FDX	Enabled	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0-3	2048	<input type="checkbox"/>	<input type="checkbox"/>								
10G-2	Down	Disabled	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0-3	2048	<input type="checkbox"/>	<input type="checkbox"/>									
MGMT	Down	Auto	<input checked="" type="checkbox"/>	0-3	2048	Discard	<input type="checkbox"/>												

Config WAN VLAN (Uplink)



1. Configure uplink/VLAN

- a. **VLAN table.** By default, the uplink is set to trunk mode and allows all vlans (3-4094), if you want it is possible to untag one vlan, set the port vlan and select “untag port vlan” in the egress tagging option.

The screenshot shows the 'Global VLAN Configuration' and 'Port VLAN Configuration' sections of the Positron Access Solutions interface. The 'Global VLAN Configuration' section includes fields for 'Allowed Access VLANs' (1,4093) and 'Ethertype for Custom S-ports' (88A8). The 'Port VLAN Configuration' section lists various ports (G.hn-1 to G.hn-12, 10G-1, 10G-2, MGMT) with their configuration details. Red arrows point to the 'Configuration' link in the left sidebar and the 'VLANs' link under 'Configuration' in the 'VLAN Translation' section of the sidebar. Another red arrow points to the '4' value in the 'Port VLAN' column for port 10G-1.

Port	Mode	Port VLAN	Port Type	Ingress Filtering	Ingress Acceptance	Egress Tagging	Allowed VLANs	Forbidden VLANs
G.hn-1	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-2	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-3	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-4	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-5	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-6	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-7	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-8	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-9	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-10	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4,4094	3840-3844
G.hn-11	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
G.hn-12	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	2,4094	3840-3844
10G-1	Trunk	4	C-Port	<input checked="" type="checkbox"/>	Tagged and Untagged	Untag Port VLAN	3-4094	
10G-2	Trunk	4095	C-Port	<input checked="" type="checkbox"/>	Tagged Only	Tag All	3-4094	
MGMT	Access	1	C-Port	<input checked="" type="checkbox"/>	Tagged and Untagged	Untag All	1	

Save Reset

Configure system



1. Configure system :

a. System Information:

- i. **System Name.** The name will be used with web, cli, snmp, and JSON. It will also be the remote ID in DHCP option-82 if activated.
- ii. Type in your system information and select save.
 1. This saves to running config
 2. Select the disk icon on the upper right to save to flash

The screenshot shows the POSITRON Access Solutions configuration interface. On the left, there's a navigation tree under 'Configuration' with 'System' expanded, showing options like 'Information', 'IP', 'NTP', 'Time', 'Time Zone', 'Log', 'Controller Announcement', 'Aggregation', and 'DDMI'. A red arrow points to the 'Information' link. In the center, a window titled 'System Information Configuration' displays three fields: 'System Contact' (JF), 'System Name' (lab19), and 'System Location' (Montreal). At the bottom of this window are 'Save' and 'Reset' buttons, with a red arrow pointing to the 'Save' button. On the right, a blue header bar shows the text 'lab19 - G' and several icons: a floppy disk (highlighted with a red box and arrow), a house, a gear, and a question mark.

System Contact	JF
System Name	lab19
System Location	Montreal

Save Reset

Configure system



b. IP/Inband Management:

- i. You can add a VLAN to the Interface by using the “add interface” button under Configuration>System>IP
- ii. Create an interface vlan for inband management from the uplink.
 1. Set a vlan with either DCHP or static IP.
 2. When using static, you should also set a default route.
 - a. Set default route with “add route”

The screenshot shows the POSITRON GAM-12-C™ G.hn Access Multiplexer configuration interface. The left sidebar menu includes sections like Configuration, System, IP, NTP, Time, Time Zone, Log, Controller Announcement, Aggregation, DDMI, DHCP, Server, Snooping, Relay & Option 82, EPS, ERPS, G.hn, GVRP, IPMC, IPMC Profile, Link OAM, LLDP, MAC Table, MEP, Mirroring, MRP, MVR, Performance Monitor, Ports (Ethernet), PPPoE, QoS, Security, sFlow, Spanning Tree, and Traffic Test. The main content area has tabs for IP Configuration, IP Interfaces (DHCPv4), and IP Routes.

IP Configuration

Domain Name	No Domain Name
Mode	Host
DNS Server 0	No DNS server
DNS Server 1	No DNS server
DNS Server 2	No DNS server
DNS Server 3	No DNS server
DNS Proxy	<input type="checkbox"/>

IP Interfaces

Delete	VLAN	DHCPv4				IPv4					
		Enable	Type	IfMac	ASCII	HEX	Hostname	Fallback	Current Lease	Address	Mask Length
<input type="checkbox"/>	1	<input type="checkbox"/>	Auto	Port G.hn-1			0		192.168.10.1	24	<input type="checkbox"/>
<input type="checkbox"/>	4	<input type="checkbox"/>	Auto	Port G.hn-1			0		192.168.101.19	21	<input type="checkbox"/>
<input type="checkbox"/>	4093	<input checked="" type="checkbox"/>	Auto	Port G.hn-1			0	192.168.201.113			<input type="checkbox"/>

Add Interface

IP Routes

Delete	Network	Mask Length	Gateway	Next Hop VLAN
<input type="checkbox"/>	0.0.0.0	0	192.168.101.1	0

Add Route

Save / Reset

Configure system



- c. **NTP/Time.** Enable NTP and set an IP. The “time” is for time zone. Note: date/time is not required for the GAM to operate. Date/time is use for alarms and events.

The screenshot shows the POSITRON Access Solutions web interface with the following details:

- Left Sidebar:** Configuration (System, Information, IP, NTP, Time, Time Zone, Log, Controller Announcement), Aggregation (DDMI), DHCP (Server, Snooping, Relay & Option 82), EPS, ERPS.
- NTP Configuration Page:** Mode: Enabled, Server 1: 192.168.101.49. A red arrow points to the "NTP" link in the sidebar.
- System Time Configuration Page:** System Time Settings: Month: Sep, Date: 8, Year: 2021, Hours: 13, Minutes: 46. A red arrow points to the "Time" link in the sidebar.
- Time Zone Configuration Page:** Time Zone Configuration: Time Zone: (UTC) Coordinated Universal Time, Hours: 0, Minutes: 0, Acronym: (0 - 16 characters). Daylight Saving Time Configuration: Daylight Saving Time Mode: Disabled. Start Time settings: Month: Jan, Date: 1, Year: 2014, Hours: 0, Minutes: 0. End Time settings: Month: Jan, Date: 1, Year: 2097, Hours: 0, Minutes: 0. Offset settings: Offset: 1 (1 - 1439 Minutes).

Configure Security



1. Security

- Set username and password
- Set access levels per lines in the menu tree

The screenshot shows the POSITRON Access Solutions software interface. On the left, the 'Configuration' menu is expanded, with red arrows pointing to the 'Security' and 'Switch' sections. The 'Security' section includes 'Users', 'Privilege Levels', 'Auth Method', 'SSH', 'Telnet', 'HTTP/HTTPS', 'Access Management', 'SNMP', 'RMON', 'Network', 'AAA', and 'Flow'. The 'Switch' section includes 'Users', 'Privilege Levels', 'Auth Method', 'SSH', 'Telnet', 'HTTP/HTTPS', 'Access Management', 'SNMP', 'RMON', 'Network', 'AAA', and 'Flow'. On the right, a table titled 'Privilege Level Configuration' is displayed, showing privilege levels for various groups. The table has columns for Group Name, Configuration Read-only, Configuration/Execute Read/write, Status/Statistics Read-only, and Status/Statistics Read/write.

Group Name	Privilege Levels			
	Configuration Read-only	Configuration/Execute Read/write	Status/Statistics Read-only	Status/Statistics Read/write
Aggregation	5 ▾	10 ▾	5 ▾	10 ▾
DDMI	5 ▾	10 ▾	5 ▾	10 ▾
Debug	15 ▾	15 ▾	15 ▾	15 ▾
DHCP	5 ▾	10 ▾	5 ▾	10 ▾
DHCP_Forward	5 ▾	10 ▾	5 ▾	10 ▾
DHCPv6_Client	5 ▾	10 ▾	5 ▾	10 ▾
Diagnostics	5 ▾	10 ▾	5 ▾	10 ▾
DiscoveryAgent	5 ▾	10 ▾	5 ▾	10 ▾
EPS	5 ▾	10 ▾	5 ▾	10 ▾
ERPS	5 ▾	10 ▾	5 ▾	10 ▾
ETH_LINK_OAM	5 ▾	10 ▾	5 ▾	10 ▾
Firmware	5 ▾	10 ▾	5 ▾	10 ▾
GhnAgent	5 ▾	10 ▾	5 ▾	10 ▾
IP	5 ▾	10 ▾	5 ▾	10 ▾
IPMC_Snooping	5 ▾	10 ▾	5 ▾	10 ▾
LACP	5 ▾	10 ▾	5 ▾	10 ▾
LLDP	5 ▾	10 ▾	5 ▾	10 ▾
MAC_Table	5 ▾	10 ▾	5 ▾	10 ▾
MEP	5 ▾	10 ▾	5 ▾	10 ▾
Miscellaneous	15 ▾	15 ▾	15 ▾	15 ▾
MRP	5 ▾	10 ▾	5 ▾	10 ▾
MVR	5 ▾	10 ▾	5 ▾	10 ▾
NTP	5 ▾	10 ▾	5 ▾	10 ▾

Troubleshooting - System information



1. System information

- a. Monitor, system information
- b. CPU Temps
- c. Working Fans
- d. Software loads
- e. Serial Number
- f. Uptime



POSITRON
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- PPPoE
- ▶ QoS
- ▶ Security
- sFlow
- ▶ Spanning Tree
- ▶ Traffic Test
- ▶ VCL
- ▶ VLANs
- ▶ VLAN Translation
- ▼ **Monitor** →
- ▼ **System** →
- Information
- CPU Load
- IP Status
- NTP status
- Log
- Detailed Log
- ▶ Aggregation
- ▶ Alarms
- ▶ DDMI
- ▶ DHCP
- ▶ G.hn
- ▶ IPMC
- ▶ Link OAM
- ▶ LLDP
- MAC Table
- ▶ MVR
- MRVP
- ▶ Performance Monitor
- ▶ PPPoE
- ▶ Ports
- ▶ Private VLANs
- PPPoE
- ▶ Security
- sFlow

lab19 - G

System Information

System	
Contact	JF
Name	lab19
Location	Montreal
Hardware	
MAC Address	00-0e-d8-13-05-18
FPGA Version (main board)	16
FPGA Version (expansion card)	Unavailable
Hardware Version	ASY-2100-20,R07
Serial Number	01012963
Temperatures	
CPU	35.8(C), 96.3(F)
Intake #1	29.6(C), 85.2(F)
Intake #2	31.8(C), 89.3(F)
Exhaust #1	30.8(C), 87.5(F)
Exhaust #2	26.8(C), 80.3(F)
Fans	
Fan #1	7019 rpm
Fan #2	7108 rpm
Fan #3	6974 rpm
Fan #4	7153 rpm
Time	
System Date	2021-09-08T13:56:00+00:00
System Uptime	15d 18:50:08
Software	
Bootloader Version	1_4-19167
Software Version	GAM-xx-C_v1.4.0
Software Date	2021-08-17T21:29:05-04:00
Code Revision	21922
Acknowledgments	Details

Troubleshooting - Syslog and alarms



2. Syslog and alarms

- a. Active alarms
- b. logs

The screenshot shows a navigation menu on the left and a main content area on the right.

Navigation Menu (Left):

- ▶ Configuration
- ▶ Monitor
 - ▶ System
 - ▶ Aggregation
 - ▶ Alarms
 - Active
 - Log
 - ▶ DDMI
 - ▶ DHCP
 - ▶ G.hn
 - ▶ IPMC
 - ▶ Link OAM
 - ▶ LLDP
 - MAC Table
 - ▶ MVR
 - MVRP
 - ▶ Performance Monitor
 - ▶ PPPoE

Active Alarms

Level All ▾

Severity ▾	Service Affecting	Entity	Alarm	Date/Time Occurrence	Description
Major	Yes	10G 1/2	LINKDOWN	2021-11-30T13:58:02+00:00	Ethernet Link Down

Troubleshooting - DHCP Snooping



3. **Configure DHCP snooping.** This is helpful for troubleshooting, it will snoop DHCP request/offer and create a table of IP assigned to subscriber. Note: The snooping is mandatory if you use DHCP authentication with option-82.

The screenshot shows the software interface for POSITRON Access Solutions. On the left, there is a navigation tree:

- Configuration
 - System
 - Aggregation
 - DDMI
 - DHCP
 - Server
 - Snooping (highlighted with a red arrow)
 - Relay & Option 82
 - EPS
 - ERPS
 - G.hn
 - GVRP
 - IPMC
 - IPMC Profile
 - Link OAM
 - LLDP
 - MAC Table
 - MEP
 - Mirroring

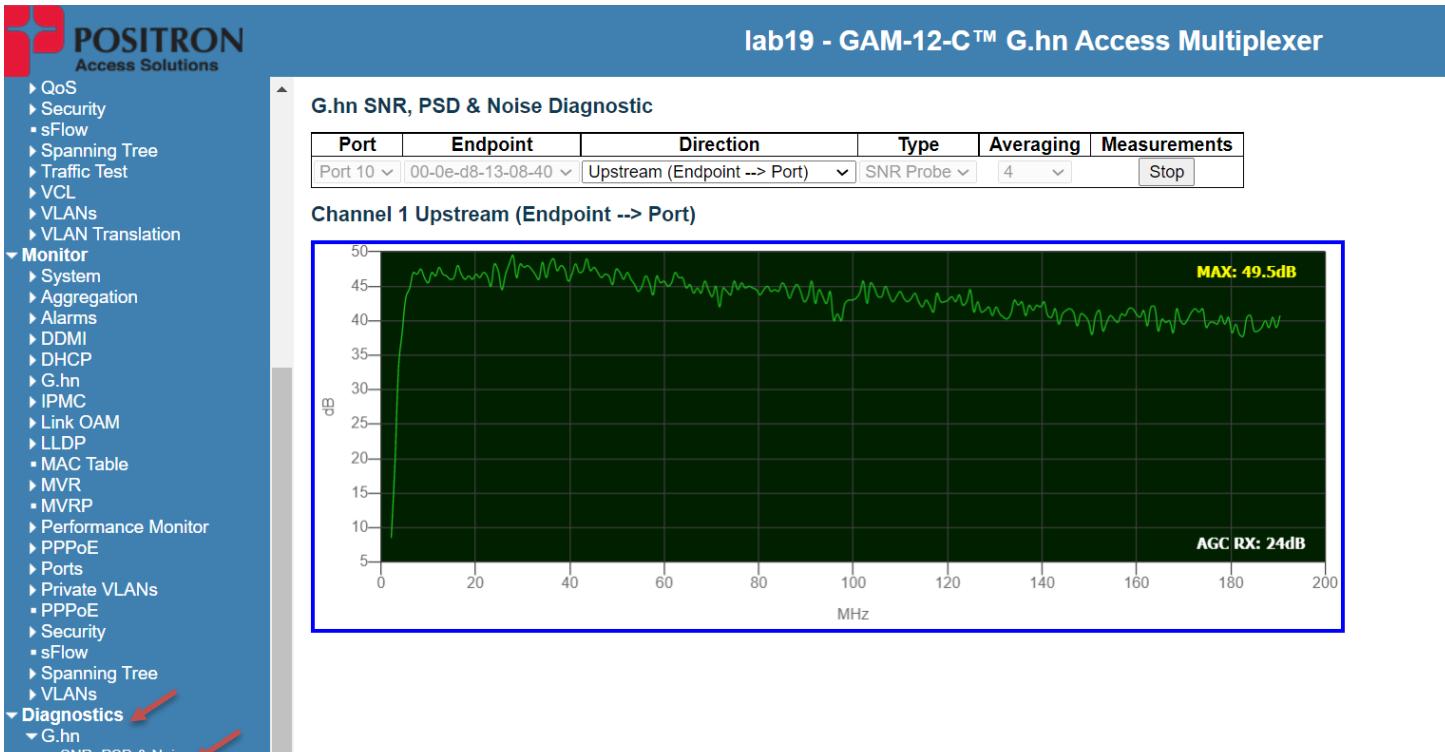
On the right, a configuration window titled "DHCP Snooping Configuration" is open. It contains a "Snooping Mode" dropdown set to "Enabled" (highlighted with a red arrow) and a "Port Mode Configuration" table:

Port	Mode
*	<>
G.hn-1	Untrusted
G.hn-2	Untrusted
G.hn-3	Untrusted
G.hn-4	Untrusted
G.hn-5	Untrusted
G.hn-6	Untrusted

Troubleshooting – Diagnostics G.hn



4. **Diagnostics G.hn.** This is useful to troubleshoot, it gives a spectrum graph of the SNR, PSD and noise on the twisted pair or coax.



Troubleshooting - DHCP table/MAC table



5. DHCP and MAC table

- DHCP snooping table-will show all the endpoint polling IP address
- Mac Table-will show active MAC address

POSITRON Access Solutions

- Mirroring
- ▶ MRP
- MVR
- ▶ Performance Monitor
- Ports (Ethernet)
- PPPoE
- ▶ sFlow
- ▶ Security
- Spanning Tree
- ▶ Traffic Test
- ▶ VCL
- ▶ VLANs
- ▶ VLAN Translation
- ▼ Monitor
 - ▶ System
 - ▶ Aggregation
 - ▶ Alarms
 - ▶ DDMI
 - ▶ **DHCP**
 - ▶ G.hn
 - ▶ IPMC
 - ▶ Link OAM
 - ▶ LLDP
 - **MAC Table**
 - ▶ MVR
 - MVRP
 - ▶ Performance Monitor
 - ▶ PPPoE
 - ▶ Ports
 - ▶ Private VLANs
 - PPPoE
 - ▶ Security
 - sFlow
 - ▶ Spanning Tree
 - ▶ VLANs

lab19 - GAM-12-C™ G.hn Access Multiplexer

Auto-refresh Ref

Start from Outer VLAN , Inner VLAN and MAC address with entries per page.

Type	VLAN	MAC Address	Port Members													
			CPU	G.hn-1	G.hn-2	G.hn-3	G.hn-4	G.hn-5	G.hn-6	G.hn-7	G.hn-8	G.hn-9	G.hn-10	G.hn-11	G.hn-12	10G-1
Static	1	33-33-00-00-00-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static	1	FF-FF-FF-FF-FF-FF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dynamic	2	00-0E-D8-13-05-30		✓												
Dynamic	2	00-0E-D8-13-05-31			✓											
Dynamic	2	00-0E-D8-13-05-32				✓										
Dynamic	2	00-0E-D8-13-05-33					✓									
Dynamic	2	00-0E-D8-13-05-34						✓								
Dynamic	2	00-0E-D8-13-05-35							✓							
Dynamic	2	00-0E-D8-13-05-36								✓						
Dynamic	2	00-0E-D8-13-05-37									✓					
Dynamic	2	00-0E-D8-13-05-38										✓				
Dynamic	2	00-0E-D8-13-05-39											✓			
Dynamic	2	00-0E-D8-13-05-3A												✓		
Dynamic	2	00-0E-D8-13-05-3B													✓	
Dynamic	2	00-0E-D8-13-08-3A														✓
Dynamic	2	00-0E-D8-13-08-40														
Static	2	01-00-5E-00-00-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static	2	33-33-00-00-00-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static	2	33-33-FF-13-05-18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static	2	FF-FF-FF-FF-FF-FF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Maintenance – Config Backup / Restore



1. Config Backup / Restore

- a. Configuration>Download = Backup
- b. Configuration>Upload = Restore

Downloaded file will be saved in the PC being used as text file in CLI format

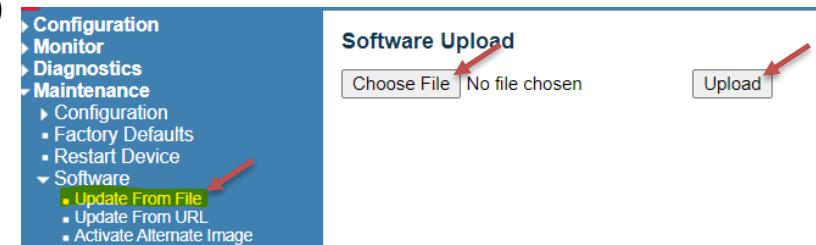
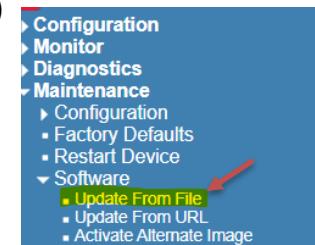
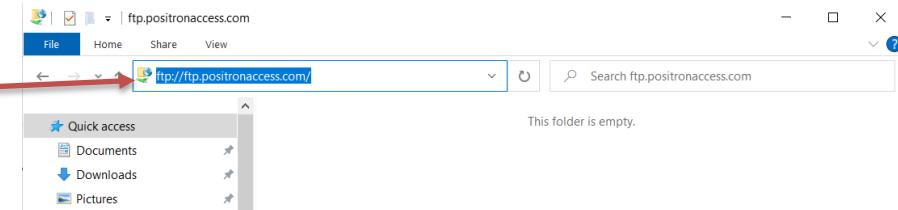
The screenshot shows a web browser window with the URL 192.168.101.19/index.htm. The page title is "Not secure". The main navigation menu on the left includes links for EPS, ERPS, G.hn, GVRP, IPMC, IPMC Profile, Link OAM, LLDP, MAC Table, MEP, Mirroring, MRP, MVR, Performance Monitor, Ports (Ethernet), PPPoE, QoS, Security, sFlow, Spanning Tree, Traffic Test, VCL, VLANs, VLAN Translation, Monitor, Diagnostics, and Maintenance. The Maintenance link is expanded, showing sub-options: Configuration, Save startup-config, Download, Upload, Activate, Delete, Factory Defaults, Restart Device, Software, Update From File, and Update From URL. Red arrows point from the text labels in the previous section to the corresponding menu items: 'Configuration' points to the Configuration link under Maintenance, 'Download' points to the Download link under Configuration, and 'Upload' points to the Upload link under Configuration.

Maintenance – Software update



2. Software update

- a. Save startup-config
- b. Get new software at <ftp://ftp.positronaccess.com>
 - a. Copy the link above and paste it on Windows File Explorer address bar
(FileZilla FTP client can be used too)
 - a. User/password: positron/positron
 - b. Go to **GAM/2-NEW-SW** folder
 - c. Select the software per your specific type of GAM (.mfi file) and save it into your PC
- c. Go to **Software>Update from file** in the menu
- d. Click on **Choose file** button and select the (.mfi) file downloaded previously
- e. Click then on **Upload** button to start update process.



IGMP Snooping

- Steps to activate IGMP snooping (IP Multicast snooping)
- Create an Interface VLAN
- Activate general snooping
- Activate snooping on video VLAN
- (optional) multicast profiles (filters)
- Monitor snooping and multicast groups.

IGMP snooping - Create an Interface VLAN

Before you can activate IGMP snooping on your video VLAN, you must create an Interface VLAN

Configuration>System>IP

IP Interfaces

Delete	VLAN	DHCPv4						IPv4			
		Enable	Type	IfMac	Client ID ASCII	Client ID HEX	Hostname	Fallback	Current Lease	Address	Mask Length
<input type="checkbox"/>	1	<input type="checkbox"/>	Auto	Port G.hn-1				0		192.168.10.1	24
<input type="checkbox"/>	4000	<input type="checkbox"/>	Auto	Port G.hn-1				0			

No need for DHCP or static IP

Note: Current software version supports IPv4.
MLD IPv6 not supported.

IGMP snooping - Activate general snooping

Configuration>IPMC>IGMP Snooping> Basic Configuration

IGMP Snooping Configuration

Global Configuration	
Snooping Enabled	<input checked="" type="checkbox"/>
Unregistered IPMCv4 Flooding Enabled	<input type="checkbox"/>
IGMP SSM Range	232.0.0.0 / 8
Leave Proxy Enabled	<input type="checkbox"/>
Proxy Enabled	<input type="checkbox"/>

By default, the GAM doesn't snoop, therefore all multicast packets will be broadcasted to all ports. It is important to uncheck flooding.

It is not recommended to use proxys, unless you have performance issue with processing high number of join/leave messages.

Port related Configuration

- Router port is where the video comes from. (optional, if not selected, the system will discover it dynamically)
- Fast leave should not be used.

IGMP snooping - Activate snooping on video VLAN

Configuration>IPMC>IGMP Snooping> VLAN Configuration

IGMP Snooping VLAN Configuration

Start from VLAN with entries per page.

VLAN ID	Snooping Enabled	Querier Election	Querier Address	Compatibility	PRI	RV	QI (sec)	QRI (0.1 sec)	LLQI (0.1 sec)	URI (sec)
1	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	Forced IGMPv2	0	2	125	100	10	1
2	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	Forced IGMPv2	0	2	125	100	10	1
4000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	IGMP-Auto	0	2	125	100	10	1
4093	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	Forced IGMPv2	0	2	125	100	10	1

Enable snooping only on
your video VLAN

The GAM should not be a querier. Most
of the time the querier comes from the
video source

All other parameters can stay default. the compatibility
mode can be forced to v2 or v3. most IPTV systems are
version 2 only.

IGMP snooping – Optional Profiles (filters)

TBD

IGMP snooping – Monitor snooping and multicast groups

Monitor>IPMC>IGMP Snooping> Status

IGMP Snooping Status

Statistics

VLAN ID	Querier Version	Host Version	Querier Status	Active Querier Address	Queries Transmitted	Queries Received	V1 Reports Received	V2 Reports Received	V3 Reports Received	V2 Leaves Received
4000	v2	v2	IDLE	192.168.200.3	0	34142	0	2520	115	27

The GAM must detect an active querier, if not, the video will disconnect ~2mins.

Monitor>IPMC>IGMP Snooping> Group Information

IGMP Snooping Group Information

Start from VLAN and group address with entries per page.

VLAN ID	Groups	Port Members					
		1	2	3	4	5	6
4000	239.255.1.240						✓



Questions???

www.positronaccess.com



Extra slides

Introducing the Positron Access GAM Portfolio



Indoor GAM

GAM-12-M



GAM-24-M



GAM-12-C



GAM-24-C



Outdoor GAM



GAM-4-MX
GAM-4-MRX

GAM-8-MX
GAM-8-MRX

GAM-4-CX
GAM-4-CRX

GAM-8-MVX
GAM-8-MDVX

G1001 Series

G1001-M



G1001-MR



G1001-C



G1001-CR



M indicates MIMO support (Copper)

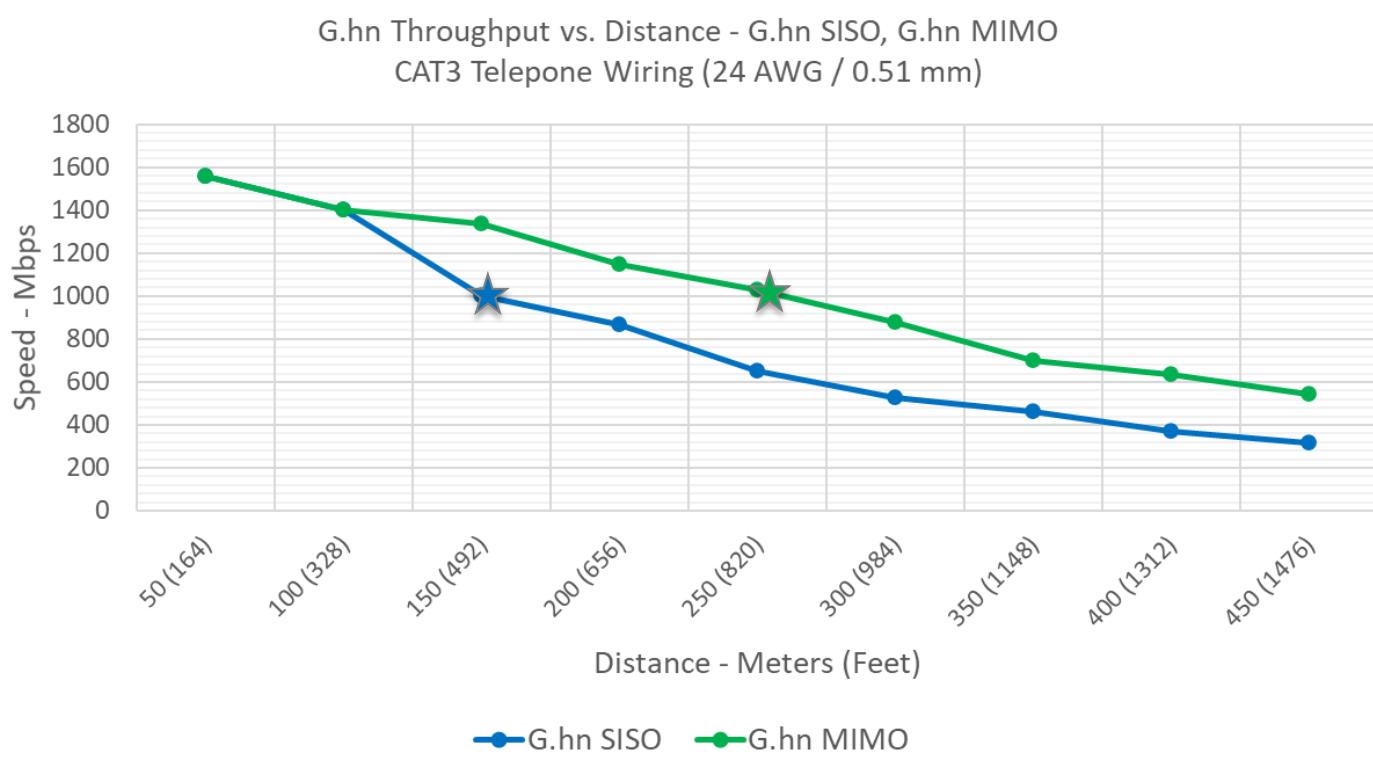
C indicates Coaxial support

D indicates DM Mode for +/- 190- VDC

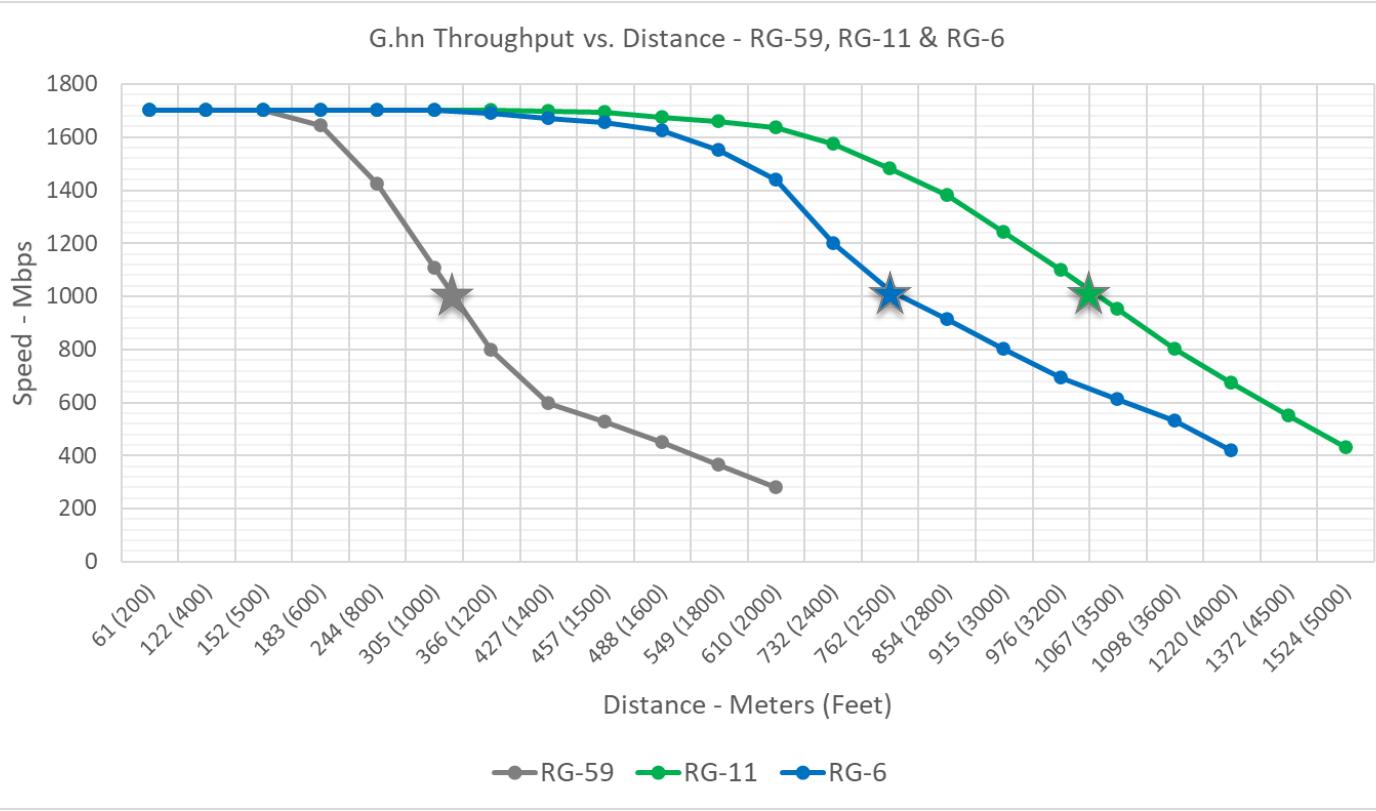
R indicates Reverse Power Feed

X indicates Outdoor (IP67) Enclosure

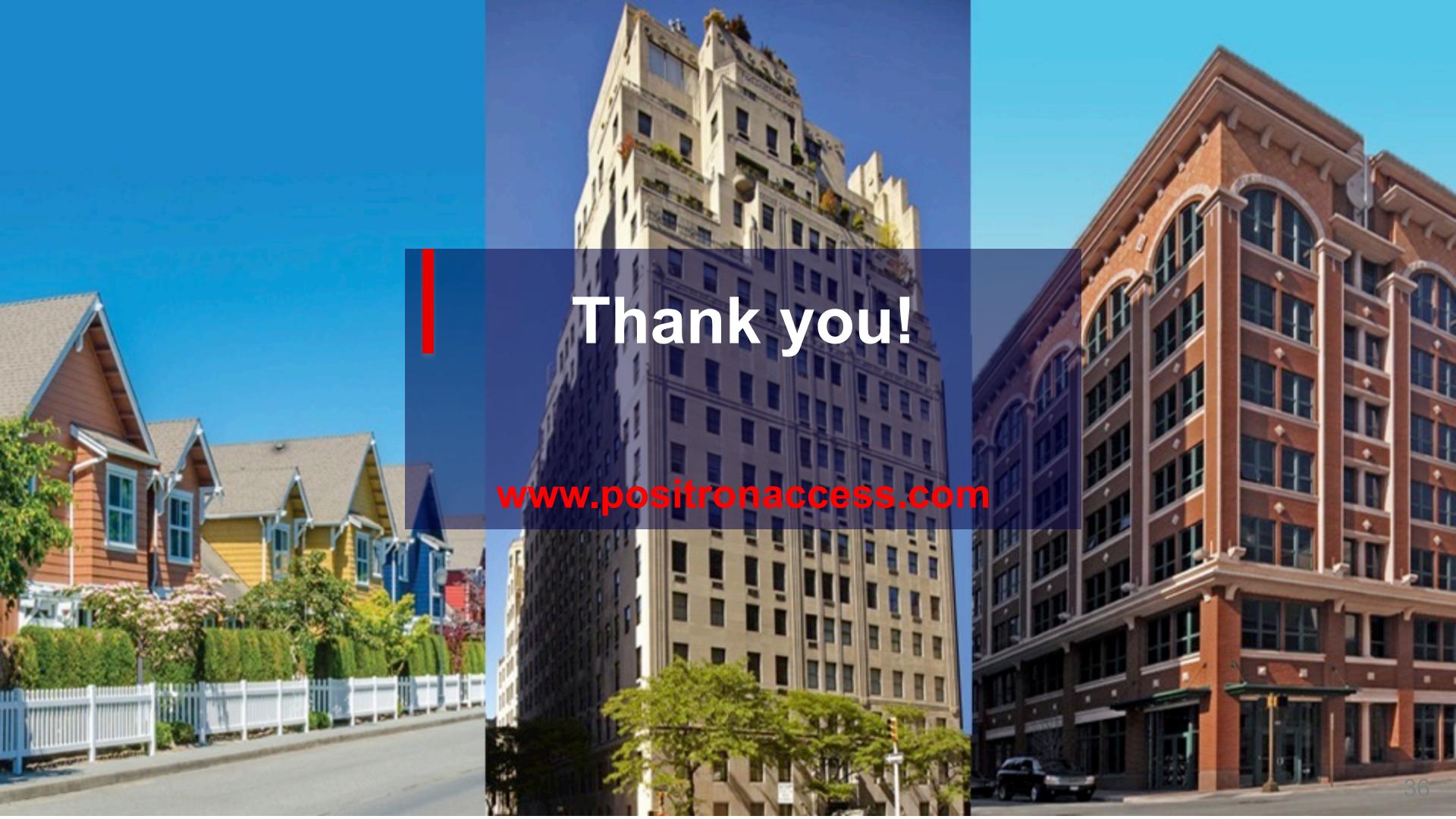
V indicates support for +/- 190V Feed



- G.hn Wave-2 significantly outperforms G.fast
- Gbps speeds to 150 meters / 500 feet on CAT3 single pair (SISO)
- Gbps Speeds to 250 meters / 800 feet on CAT3 2-pair (MIMO)



- G.hn takes advantage of Coaxial cable properties (No Amps, supports Splitters)
- Faster speeds over longer distances
- Beats DOCSIS (rate/reach, symmetry)
- Much less expensive and easier to manage than CMTS
- Designed for the future: 8k streaming, gaming, IoT



Thank you!

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