

# Delivering Gigabit to the Home

## Positron G1001-MR and G1001-CR

### G.hn to Ethernet Managed End Point with support for Reverse Power Feed

**G1001-MR****G1001-CR**

#### About G.hn

The ITU-T G.9960 G.hn Wave-2 standard leverages the existing telephone wiring (UTP, CAT-3 or CAT-5/5e) or RG-6/RG-59 coax cabling as an access technology that delivers a Gigabit Internet service to each subscriber at a lower cost and without the complexity and delays associated with in-building fiber installation. G.hn is used as an Access technology by Operators looking to simplify their access network and backend infrastructure with an Ethernet-like technology that is highly scalable without some of the inherent complexity of DSL-related technologies. Operators increasingly rely on G.hn to extend fiber or fixed wireless Gigabit services and avoid the high capital and operational expenses of a fiber retrofit. The Positron GAM solution is MEF CE 2.0 compliant and is ideally suited to deliver Business Ethernet services in an MDU and/or MTU deployment.

“Fiber to the Home” is far from the only and most efficient technology to deliver Gigabit Internet access to subscribers. Retrofitting an existing (brownfield) Multi-Dwelling Unit (MDU) with fiber is complex and expensive. The Positron G.hn Aggregation Multiplexer (GAM) family delivers near symmetrical Gigabit Internet access to subscribers in MDUs over the existing telephone or coaxial infrastructure at a fraction of the cost of alternatives.

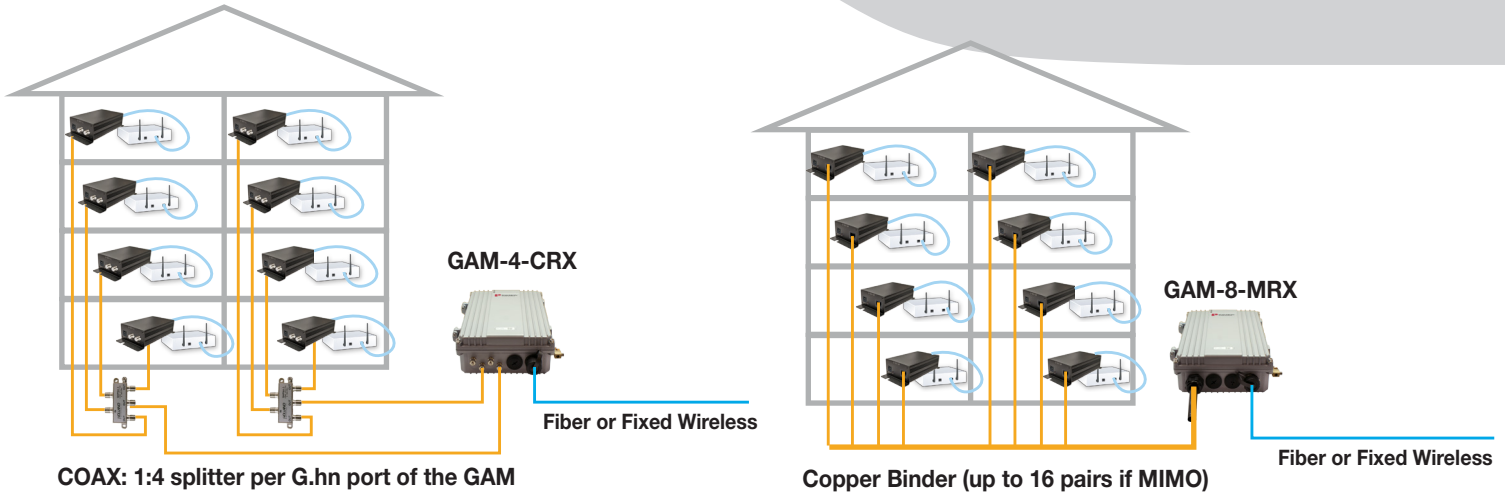
The G1001-MR and G1001-CR G.hn to Ethernet Managed Demarcation Point devices power the Positron rugged IP67 (outdoor and extended temperature) GAM family with support for the ETSI Reverse Power Feed (RPF). Support for RPF facilitates the installation of the GAM outside of the MDU or MTU and in areas where it is not simple or cost effective to install a local power source. The GAM-8-MRX and GAM-4-MRX respectively have eight (8) and four (4) MIMO ports and can operate when powered from G1001-MR devices in SISO or MIMO mode. The GAM-4-CXR has four (4) COAX ports and can operate when powered from G1001-CR devices. Each G1001-MR or G1001-CR powers a single G.hn port of the outdoor GAM devices.

#### About the G1001 Managed Demarcation Point with RPF Support

When operating in a Reverse Power Feed mode, the outdoor GAM devices will always make sure that each G.hn End-Point devices it serves evenly contribute to provide power to the GAM via RPF. This means that the outdoor GAM will reject G.hn End-Point devices that do not provide their share of the power required by the GAM.

The G1001 devices control how a Residential Gateway (or User CPE) connects to the G.hn Access Network under the control of the Positron GAM. In this role, they make sure the information transmitted over the G.hn links is protected with strong AES-128 encryption. When used in Point-to-Multipoint mode (coaxial wiring), the G1001-CR operates under control of the GAM to isolate the traffic from each subscribers that share the same coax splitter.

**NOTE:** When there are multiple G1001-CR devices on the same GAM Coax port, each of the G1001-CR will share the power load evenly amongst them.



### About the Rugged Outdoor Positron GAM Devices

The Positron G.hn Access Multiplexer (GAM) family now includes rugged versions for deployment in harsh environments (outdoor) where there is no local power source. These GAM devices obtain their power from the G1001-MR over the copper wiring or G1001-CR over the COAX cabling. The outdoor GAM devices offer the same feature and management capabilities as their indoor counterpart. They optimize coverage of Gigabit Internet services in an MDU and operate over twisted-pair wiring in Point-to-Point mode while operation over a coax infrastructure is in Point-to-multipoint mode where each COAX port can serve up to sixteen (16) G1001-CR devices.



### Ordering Information

Part Number	Description
<b>G1001-MR</b>	G.hn Wave-2 to Ethernet Bridge over Twisted Pair Supports Multiple Input Multiple Output (MIMO) and Single Input Single Output (SISO) modes G.hn port (RJ45 port) One (1) 10/100/1000BaseT RJ45 port Supports Reverse Power Feed (acting as a Power Sourcing Equipment - PSE)
<b>G1001-CR</b>	G.hn Wave-2 to Ethernet Bridge over Coax G.hn port (F-type connector) CATV port (F-type connector) One (1) 10/100/1000BaseT RJ45 port Supports Reverse Power Feed (acting as a Power Sourcing Equipment - PSE)
<b>GAM-4-MRX</b>	4 port G.hn Access Multiplexer (GAM) for use over Twisted Pair wiring for 1 pair (SISO) or 2 pairs (MIMO) per G.hn port IP67-rated with extended temperature operation (-40°C to +65°C) Supports Reverse Power Feed (acting as a Powered Device - PD)
<b>GAM-8-MRX</b>	8 port G.hn Access Multiplexer (GAM) for use over Twisted Pair wiring for 1 pair (SISO) or 2 pairs (MIMO) per G.hn port IP67-rated with extended temperature operation (-40°C to +65°C) Supports Reverse Power Feed (acting as a Powered Device - PD)
<b>GAM-4-CRX</b>	4 port G.hn Access Multiplexer (GAM) for use over Coaxial cable (F-Type connector) with up to 16 G1001-CR devices per Coaxial port IP67-rated with extended temperature operation (-40°C to +65°C) Supports Reverse Power Feed (acting as a Powered Device - PD)

## Specifications

Environmental	
Dimensions	3.7" Width x 1.35" Height x 6.7" Depth / 95 mm W x 34.3 mm H x 169.5 mm D
LED	RPF, Short, Open, Bad, G.hn, Power, Status and Gigabit Port link/active
Power Source	12 VDC / 2A power adapter (included with the G1001-MR and G1001-CR devices)
Power Consumption	The G1001 devices draw power for their own operation (no more than 3W) and for the operation of the GAM device which requires about 21W when it gets its power from a single G1001 device. The worst case power consumption is therefore 24W
Reverse Power Feed	Complies with ETSI TS 101 548 v.2.2.1
Certification	CE Mark, FCC Part 15 Class B
Operating Temperature	0°C to +40°C
Storage Temperature	-40°C to +70°C
Operating Humidity	5% to 95% relative, non-condensing
G.hn Specification	
G.hn Standards	G.hn Wave-2 Client Based on GigaWire Alliance specification and fully compliant with the following ITU-T standards <ul style="list-style-type: none"> <li>• G.9960 Amendment 2 - System Architecture and PHY Layer</li> <li>• G.9961 Data Link Layer</li> <li>• G.9962 Management</li> <li>• G.9964 PSD</li> </ul>
Ease of Deployment	Support G.hn operation over telephone wiring (G1001-MR) or coax cabling (G1001-CR)
Point-to-Point and Point-to-Multipoint support	Supports Point-to-Point (twisted pair) with G1001-MR and Point-to-Point / Point-to-Multipoint operation (coax) for up to sixteen (16) G1001-CR per G.hn port
Ease of Operation	Automatic firmware and configuration management via the Positron GAM
Encryption	AES-128 encryption with individual keys for each end-node under the control of the Positron GAM acting as the Master Node
Modulation and Frequency Band	Supports OFDM 200 MHz (Single Input Single Output - SISO) on a single pair or OFDM 100 MHz (Multiple Input Multiple Output – MIMO) on two (2) pairs per port Neighbor Domain Interface Mitigation (NDIM) Radio Band Notching function allows cohabitation with legacy Analog Cable TV channels over coax
Bandwidth Management with Dynamic Time Allocation	Up to 1.7 Gbps with Dynamic Time Allocation to optimize throughput based on nature of traffic flows with TDD Multiplexing for programmable upstream / downstream ratio
Vectoring (Telephone Wiring)	Support for VectorBoost™ vectoring for FEXT (Far-End Crosstalk) mitigation and improved performance over Telephone wiring
Mitigation of Near-end Crosstalk	Near End Crosstalk (NEXT) Mitigation and support for Neighbor Domain Interface Mitigation (NDIM)
PSD	Programmable PSD mask for coexistence with xDSL / radio and Far End Crosstalk (FEXT) mitigation via VectorBoost™ vectoring
Reliability and Resiliency	State of the art LDPC Forward Error Correction (FEC)