

Fresh Ideas to Deliver Gigabit Services in MDUs

Internet providers and building owners are taking advantage of G.hn technology to deliver gigabit internet access and other services over existing copper wiring or coax cabling.

By Pierre Trudeau / *Positron Access Solutions*

In a previous **BROADBAND COMMUNITIES** article, I introduced how G.hn technology extends gigabit services from FTTH technologies (such as GPON and EPON) or from fixed wireless access technologies, such as millimeter wave (see “Reimagine Delivery of Gigabit Services in the MDU or MTU,” October 2019). These technologies are efficient in bringing high-speed internet to an MDU or MTU but face significant challenges reaching each door inside the building.

Let’s examine how innovative operators rely on G.hn to reuse existing telephone wiring or coaxial cabling inside a building.

In addition to the desire to reduce costs, building owners and tenants have strong resistance to disruptive construction required to deploy fiber to each door or make any changes to the existing wiring infrastructure. Condominium owners and tenants prefer receiving all services (OTT video, network TV, voice) on the same “wire.”

SHARED CHALLENGES

What’s the common link between Managua (Nicaragua), a Maryland suburb and downtown Atlanta? Projects in each location were under time and budget pressures to install and activate new or improved high-speed internet and broadband services in brownfield buildings. In each case, legacy technologies such as DOCSIS, Ethernet over Cat 5 or 6 structured wiring,

EPON/GPON (to the door) and G.fast would have been natural technology choices. Yet, they were all victims of their shortcomings and simply could not meet the challenge.

Meanwhile, three service operators – Teko Telecomunica, Quantum Internet and GigaMonster – were looking for ways to disrupt their local markets, and found the Managua, Maryland and Atlanta projects presented the perfect opportunities. The three operators thrive on innovation to help reduce costs and seek to provide more benefits, gain a competitive advantage and achieve a faster time to revenue. They turned to Positron Access and its G.hn product family to leap ahead of the competition. Let’s look at how they made the projects successful.

G.HN UPENDS DOCSIS ON ITS HOME TURF

In late 2019, the Auto Hotel in Managua, Nicaragua, approached service provider Teko Telecomunica about providing IPTV service and high-speed internet service to its guest rooms. Teko was under pressure to deliver a robust solution very quickly and within a tight budget. Using Positron’s G.hn solution, it installed a 12-port G.hn Access Multiplexer for coax (GAM-12-C) over the existing coaxial infrastructure.

The small hotel, with 23 themed guest rooms and five VIP rooms, required the installation of an IPTV service for each room.

It also required a minimum of 15 Mbps internet access to each room. Because there was an existing coaxial infrastructure, Teko's initial approach was to install a hybrid fiber coax solution with a third-party DOCSIS-based CMTS. Besides the very high cost of this approach, Teko quickly encountered serious issues with the IPTV image quality, which resulted in a poor experience for guests.

The average wiring distance to the guest rooms exceeded 350 feet (100 meters), which meant installing a standard Gigabit Ethernet switch was out of the question. Teko was also looking for a solution to interface easily and seamlessly with the GPON service already in place to serve the hotel.

As Teko began investigating alternatives, it discovered Positron's G.hn solution. With the GAM-12-C, Teko was able to leverage the existing coaxial cabling. The hotel ownership was adamant about minimizing disruption, and installing and activating GAM-12-C took just one hour. After validating the new network architecture with two Positron G1001-C endpoint devices serving two guest rooms, Teko now serves all 28 rooms with IPTV and high-speed internet access. The current HSI offering is only 15 Mbps, but the GAM-12-C can deliver gigabit speeds to each guest room without any changes to the coaxial cabling or the GAM device by simply enabling a higher-speed profile.

STEP ASIDE, DOCSIS

GigaMonster recently won a project to deliver internet services and DirecTV to a large upscale condominium tower in downtown Atlanta with 16 floors and 132 doors. The condominium owners demanded that no new construction work be required to offer a combined gigabit and DirecTV service to each unit.

Although the condominium tower is a recent build, extending a fiber connection to each unit was out of the question. In addition to avoiding any construction work, there was a strong desire to deliver the triple-play

services over a single medium. Coaxial cable is the only option for DirecTV and its single wire multiswitch technology, which means that gigabit internet services must operate over coax, and both technologies have to work together peacefully and share the same medium.

With a coaxial cabling architecture, the gigabit internet service needs to operate seamlessly and securely in the presence of a coax splitter. The coaxial infrastructure relies on 1:8 splitters to cost-effectively reach all of the building's doors. With all units able to subscribe to gigabit services, there is a



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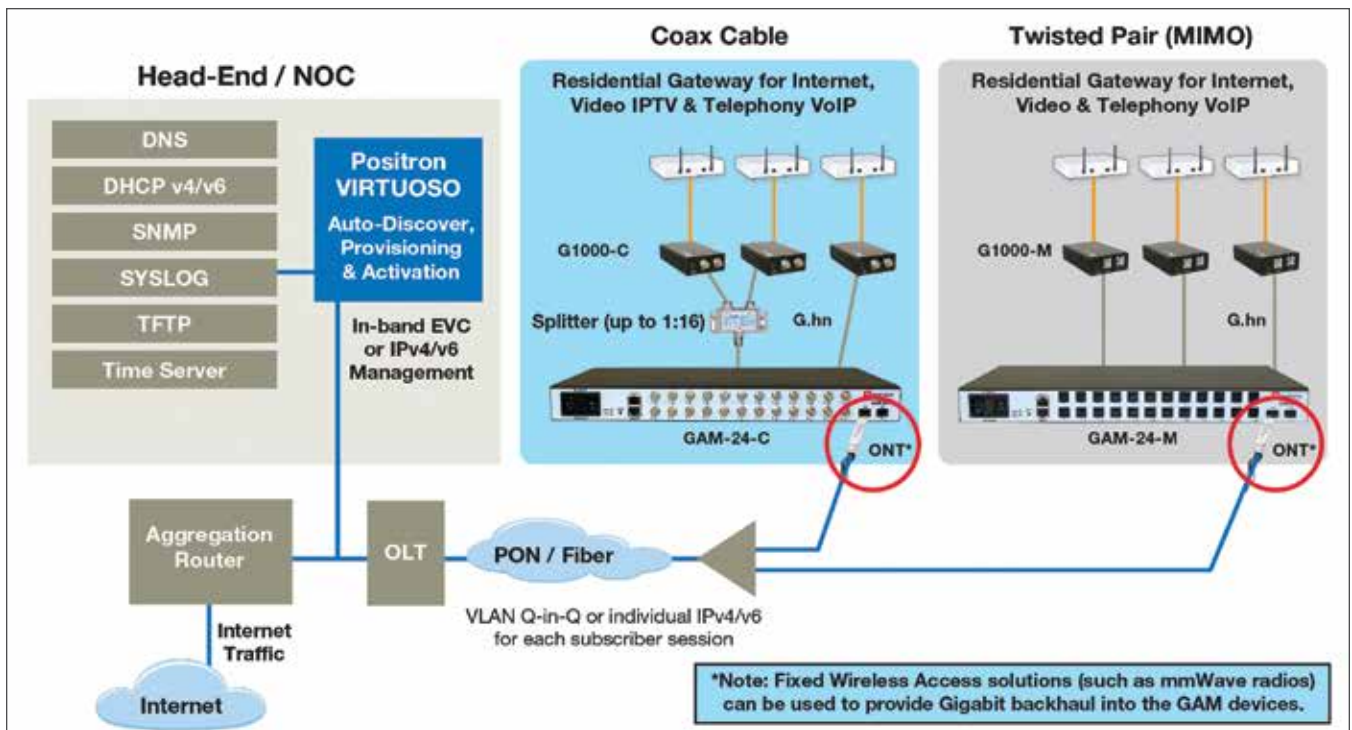
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Positron's GAM enables providers to deliver high-speed broadband over existing wiring to MDU and MTU properties.

need to handle bandwidth demands for all subscribers on the same coaxial feed and deliver bandwidth in the downstream and upstream direction as per the "real" bandwidth demands

and not with a static ratio, as is the case with DOCSIS. Quality of service is important for value-added services such as IP telephony and OTT video streaming, and minimizing latency

and jitter are critical to achieve the best possible user experience.

When GigaMonster uses or installs Cat 5 or Cat 6 structured cabling, it finds Positron's G.hn GAM-24-C solution is the best fit. Each coaxial port of the GAM can support an average of five to six – and up to 16 – subscribers. Furthermore, the G1001-C (G.hn to Ethernet bridge) incorporates a coaxial splitter to easily connect to the DirecTV set-top box and eliminate installing another splitter in each unit. A Gigabit Ethernet port of the G1001-C connects to the residential gateway (usually a Wi-Fi router). GigaMonster installed the GAM-24-C on the 10th floor (out of 16). It connects to the internet via a high-speed fiber connection brought through an existing conduit.

WHY USE VDSL2?

Quantum Internet & Telephone recently assumed responsibility for supplying connectivity services to a privately owned student-housing campus in Maryland. This garden-style complex consists of two rows of six

DEFINING G.HN TECHNOLOGY

G.hn is an access technology for operators that want to simplify their access networks with an Ethernet-like technology. With G.hn, operators deliver advanced services such as gigabit high-speed residential internet and 4K IPTV without the high capital and operational expenses associated with a fiber retrofit. Each G.hn subscriber port supports up to 1.7 Gbps of dynamically allocated bandwidth for near-symmetrical gigabit services over the existing telephone wire or coaxial cable.

Positron's GAM connects to GPON, fiber or fixed wireless access backhaul and connects with existing residential gateways with Gigabit Ethernet router ports. In addition to delivering residential high-speed internet, Positron's G.hn Access Multiplexer (GAM) solution is compliant with MEF CE 2.0 and can deliver business Ethernet services in an MTU deployment.

The ITU-T G.9960 G.hn Wave-2 standard leverages the existing telephone wiring (UTP, Cat 3 or Cat 5/5e) or coax cabling (RG-6/RG-59) to deliver a gigabit internet service to every subscriber inside an MDU or MTU without the cost, complexity and delays associated with in-building fiber installation.

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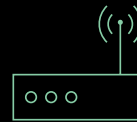
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two-floor buildings, each with eight apartments. Internet connectivity to each row of buildings was previously achieved with VDSL2 loops of about 500 feet (150 meters) and was limited to 100 Mbps downstream/50 Mbps upstream to each group of buildings. With internet demand skyrocketing from students, a lot more bandwidth over the same copper infrastructure was needed.

The 100 Mbps limit meant that, in peak hours, the average bandwidth to each row of houses was barely 2 Mbps per student. This was clearly an issue for concern, especially in an environment in which high-speed internet access is critical.

There is existing Gigabit Ethernet connectivity over the structured wiring in place between each building and the next in the rows of houses, but the fiber connection could not easily and cost-effectively be extended beyond the current point of presence. The fact that Ethernet is unusable on the outside-plant copper infrastructure was the reason to use VDSL2 for that initial stretch of 500 feet (about 150 meters). Installing a fixed-wireless access link could have been a potential solution, but there was a strong preference by all parties involved to reuse the copper wiring already in place. The selected solution had to integrate seamlessly with the managed Wi-Fi coverage in these buildings. Time was of the essence to replace the VDSL2 access, and prolonged downtime was out of the question.

With G.fast deemed too complex, too expensive and less reliable, the Positron G.hn GAM-12-M solution allowed Quantum to deliver up to 1 Gbps of aggregate bandwidth (or 500 Mbps symmetrical) to each row of houses over a single copper pair. This 500 percent increase in the bandwidth is a huge improvement, providing all students with the bandwidth they demand. The secure and managed Positron G1000-M (G.hn to Ethernet bridge) connects to the in-house router and Wi-Fi infrastructure to serve the students. This one-to-two-hour migration allowed Quantum to fit

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seamlessly with the existing structured wiring and Wi-Fi coverage without any other changes.

BEATING LEGACY TECHNOLOGIES

Property management companies and building owners are becoming increasingly internet-savvy and demand a lot more from operators serving their properties. They expect no less than state-of-the-art internet and broadband services with the best possible quality of experience.

For building owners, that starts with a desire to avoid disruptive construction work and long installation delays. Owners understand that gigabit services are now the most important amenity feature sought by buyers and renters who will not settle for less. This forces service providers to look for cost-effective technologies that are simpler to operate and manage than existing alternatives and offer a faster market-share growth.

This is where G.hn has the upper hand. It is the only technology to deliver scalable real-time gigabit services over the existing copper wiring or coaxial infrastructure. It offers reliable, predictable performance and fits seamlessly in the GPON or fixed wireless access operator's network and customer management systems.

POSITRON'S GAM

The Positron GAM leverages a non-blocking CE 2.0 Carrier Ethernet core for reliable delivery of managed gigabit services for MDU and MTU properties. The GAM is a distribution point solution and comes with multiple 10 gigabit SFP+ interfaces to support any type of fiber or PON standards (using an ONT as required) or connection to fixed-wireless modems.

At the subscriber premises, the G-1001 modem converts G.hn to Gigabit Ethernet to ensure full compatibility with all residential gateways.

With the Positron GAM, high-speed gigabit internet services are more stable, reducing support calls and customer churn. By extending management capabilities to the G.hn endpoint device, the GAM software eliminates the more complex functions of the residential gateway. The GAM hardware enforces per-subscriber bandwidth profiles and guarantees a fair, balanced use of the backhaul link to include value-added services such as IPTV, video streaming, online gaming and telephony. Its extensive support for VLAN (including Q-in-Q) allows seamless integration with the operator xPON services and the OSS and BSS functions already in place.

The Positron GAM is available in 24- and 12-port configurations for either coaxial cable or twisted pair with support for SISO (one pair per port) and MIMO (two pairs per port).

INNOVATION IS KEY

Operators rely on G.hn to take on challenges that other legacy broadband technologies fail. G.hn is the perfect technology to gain market share. It is quick and simple to install and changes the rules of the game by delivering the gigabit and broadband experience condominium owners and tenants demand at lower cost and without construction disruption.

Building owners see the value of their properties increase with significantly reduced churn. With telecommuting on the rise, G.hn provides necessary bandwidth. ❖

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