G.hn vs. MoCA - A Comparative Guide to MDU Networking Solutions

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INTRODUCTION

The demand for high-speed internet has skyrocketed, with users relying more heavily on connected devices for work, entertainment, and daily activities. And when it comes to broadband performance, scalability and reliability, nothing beats fiber, which is why the number of FTTH subscribers is growing faster than any other access technology.

To meet this demand, broadband providers are eyeing lucrative Multi-Dwelling Units (MDUs) they may have passed over in earlier planning. MDUs (condominiums, hotels and mixed use properties) have posed unique challenges for internet service providers due to the potential for extensive and costly rewiring for providing fiber access. Installing fiber in existing buildings usually necessitates new conduit pathways, which are expensive and complex, particularly in older structures not pre-wired for fiber. Installation is disruptive, causing noise, dust, and temporary loss of access in occupied buildings. And older buildings' existing wiring and network infrastructure may not be compatible with fiber optic installations, requiring upgrades or modifications. Installing fiber throughout these types of facilities is time consuming and complex. And in some cases, it's simply impossible. Fortunately, there are alternatives.

Two key technologies that have emerged in this space are Gigabit Home Networking (G.hn) and Multimedia over Coax Alliance (MoCA). Both technologies are designed to cost-effectively extend gigabit broadband to tenants in MDUs, particularly in locations where deploying fiber directly to each apartment is impractical or cost prohibitive. G.hn and MoCA represent two of the leading solutions in this space, offering alternatives to traditional Wi-Fi by leveraging existing in-building infrastructure. These two alternatives allow broadband providers to deliver high-speed internet over existing in-building infrastructure, offering an attractive solution to avoid disruptive and expensive rewiring.

Broadband operators can offer dependable Gigabit internet speeds to customers in MDUs leveraging the existing wiring already in place, without the need for any building retrofit. They can expand their market reach and deliver an impressive ROI with minimal capital outlay.

This white paper will compare G.hn and MoCA technologies, providing insight into their features, differences, pros, and cons, and helping you make an informed decision about which solution best fits your and your customers' needs.

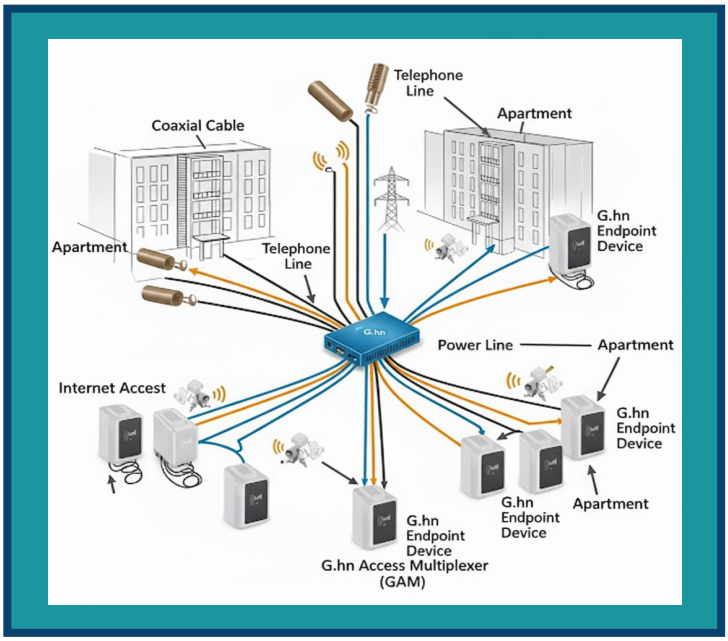
WHAT IS G.hn?

G.hn is a highly scalable, wired, Ethernet-based networking standard developed by the International Telecommunication Union (ITU) that enables high-speed data transmission over existing in-building wiring. Unlike traditional networking solutions that require new infrastructure, G.hn takes advantage of the existing wiring to extend high-speed internet connectivity throughout a building. G.hn is used as an access technology by broadband service providers (including telcos, cable companies, ISPs, and WISPs) looking to extend Gigabit services to properties over the in-building wiring.

G.hn supports speeds up to 2 Gbit/s and operates over four types of legacy wires: telephone wiring (including CAT5 and CAT6), coaxial cables, powerlines, and plastic optical fiber. It serves as a bridge, connecting older systems with modern technologies that can revolutionize operations.

With G.hn, operators deliver advanced Gigabit Ethernet connectivity and managed Wi-Fi 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 symmetric Gigabit services. Each G.hn link is encrypted with 128-bit keys for additional security.

Used by large operators in multiple markets, G.hn solutions help them provide Gigabit services across MDUs, including Townhouses and Garden Homes, the Hospitality industry and Single Family Units. G.hn is a great tool for both Cable Operators and traditional fiber operators, enabling them to deliver high-quality internet service to more customers at a lower cost. By leveraging the robustness of G.hn and its predictable bandwidth, providers can scale up to large deployments that complement their existing infrastructure investments in Passive Optical Networks (PONs).



Here's How It Works

A G.hn multiplexer is connected to the building's existing wiring, converting the data into a radio frequency signal that can travel over the building's electrical wiring, coax cables, or phone lines, depending on the type of G.hn system used. At the receiving end, a G.hn adapter converts the signal to Ethernet, and it is plugged into a subscriber's computer or router.

G.hn dynamically allocates bandwidth to different users and applications as needed, optimizing performance and minimizing latency. Each G.hn subscriber port supports up to 1.7 Gbps of dynamically allocated bandwidth for near symmetrical Gigabit services over the existing wiring. G.hn uses OFDM to divide the available frequency spectrum into numerous sub-carriers, which allows for efficient data transmission and greater robustness against interference. It is designed to be interoperable with other technologies, such as Wi-Fi, allowing for seamless integration within a broader MDU network.

About the G.hn Access Multiplexer

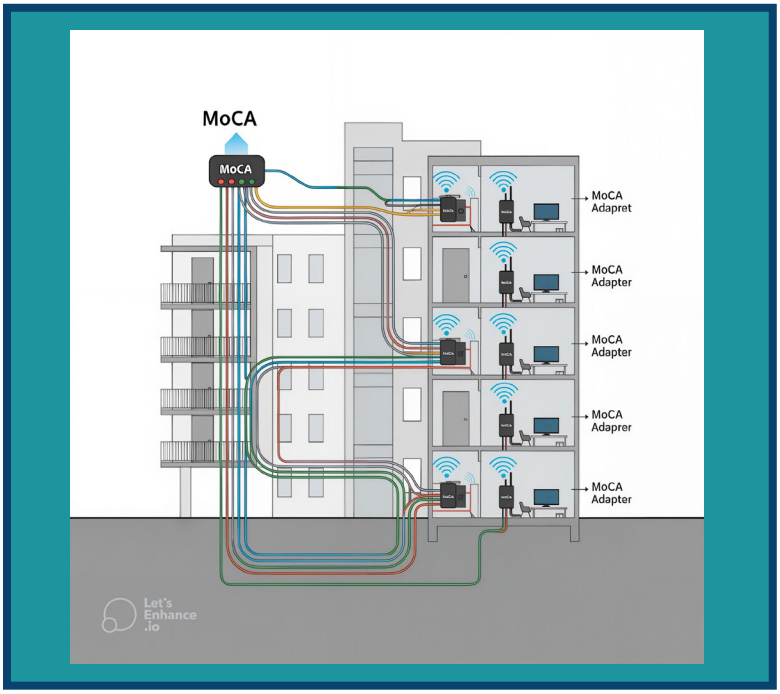
The multiplexer operates in point-to-point mode over telephone wiring and also supports point- to-multipoint operation over coaxial cabling by leveraging the existing CATV splitters and taps. The solution is ideally suited to deliver data connectivity and Ethernet services in MDU, MTU, and Hospitality deployments.

When using a multiplexer it is possible to serve up to 384 G.hn subscribers over a coaxial infrastructure. This is achieved because G.hn natively operates in point-to-multipoint mode with standard coax splitters (up to 1:16 per port). The multiplexer terminates the links with a G.hn client device. Compliant Residential Gateways with built-in G.hn client support or with SFP ports are also fully supported.

WHAT IS MoCA?

MoCA (Multimedia over Coax Alliance) is a technology designed to extend high-speed networking capabilities over existing coaxial cables. MoCA leverages the coaxial network to provide a reliable, high-performance internet connection. MoCA is an established solution, widely used for enhancing Wi-Fi coverage and providing a stable wired backbone for internet connectivity. For service providers, MoCA technology can deliver multi-gigabit services to tenants in MDUs over the building's existing coaxial cables. Tenant subscribers enjoy the same type of experience they'd have with FTTH, and service providers are able to manage the network in the same way, as part of their FTTH network. With a MoCA solution, operators can easily extend the reach of their PON network to MDUs and other buildings in which full fiber deployment would be too expensive or complex.

Here's How it Works:



Fixed Wireless Extension

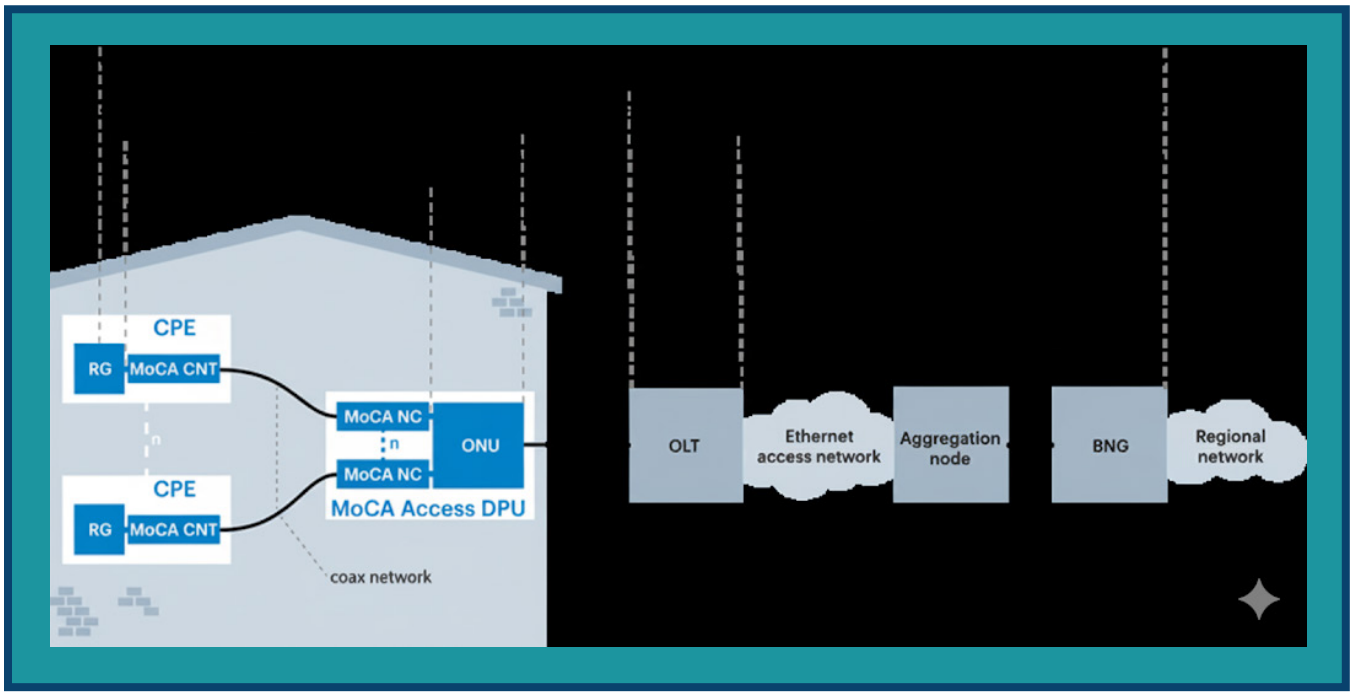
Since many buildings already have coaxial cables running to various apartments or rooms, MoCA technology uses adapters that connect to existing coaxial outlets being used for cable TV or satellite. MoCA adapters then transmit data signals over the coaxial cables, essentially creating a wired network. A MoCA adapter connects to the subscriber's router via an Ethernet cable. Other MoCA adapters can then be connected to coaxial outlets in other rooms, allowing devices in those areas to connect to the network via Ethernet. This wired connection provides faster speeds, lower latency, and improved reliability compared to Wi-Fi, especially in larger apartments or areas with poor Wi-Fi coverage, such as those with thick walls.

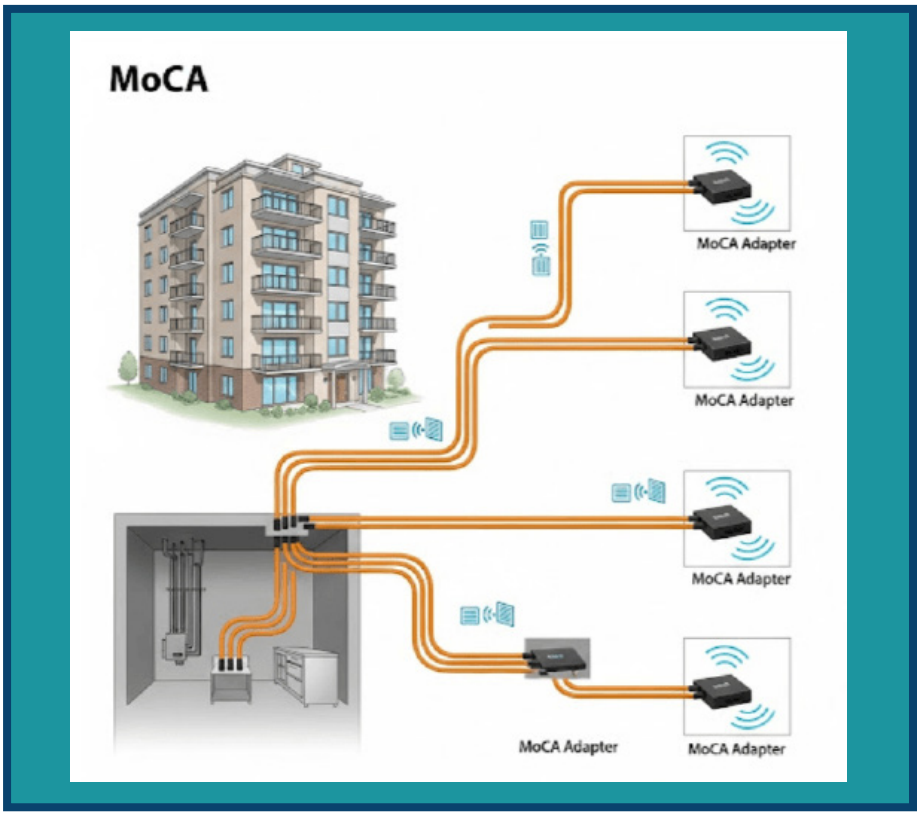
Fiber Access Extension

With a MoCA access solution, operators can easily and cost-effectively extend the reach of their PON network to MDUs and other buildings in which a full fiber deployment would be too expensive or complex. A MoCA fiber access solution uses distribution point units (DPUs) and modems to deliver gigabit and multigigabit services to subscribers over the existing coaxial cable. In simpler terms, a DPU converts the language of fiber optic cables to the language of the existing cable TV wires. Like G.hn, this results in high-speed internet without needing to rewire a building with fiber optics.

The DPU is connected to the XGS-PON on one side and the building's existing coaxial cable on the other. A sealed, passively cooled DPU can be installed outdoors or in-building and supports up to 16 modems in a point-to-point or point-to-multipoint topology. The modems can be self-installed and provide a low latency, 2Gbps symmetrical subscriber experience.

RG to BNG Link (Customer)





In a MoCA deployment, there isn't a direct one-to-one equivalent as there is with a G.hn Access Multiplexer, where a single device performs the same set of aggregation and management functions for multiple users. However, components exist that collectively perform some analogous tasks. Devices such as MoCA-enabled routers or standalone adapters convert Ethernet signals to MoCA and vice versa, allowing a subscriber's CPE to connect to the network via coaxial cables. The existing coaxial cable infrastructure itself forms the physical medium for the MoCA network, and standard coax splitters can connect multiple MoCA devices to a single coax line.

FEATURES AND BENEFITS OF G.hn TECHNOLOGY

Utilizes Existing Infrastructure:
G.hn can leverage multiple types of existing wiring in older buildings to create an in-building network. It is versatile in its ability to use electrical wiring, phone lines, or coaxial cables to deliver broadband service, avoiding the expense and disruption of installing new cables. This means faster setup and less downtime for businesses and residents.

Gigabit Speed Capability:
G.hn supports high-speed data rates, with some implementations capable of providing gigabit speeds of up to 2 Gbit/s, making it suitable for demanding applications such as 8K streaming, online gaming, and large file transfers.

Extends WiFi range:
G.hn can be used to extend WiFi coverage to hard-to-reach areas in the building by acting as a bridge between the router and WiFi extenders.

Enhanced noise immunity:
G.hn is designed to be more resilient to noise and interference from other electrical devices, resulting in a more stable and reliable connection compared to older technologies.

Consistent performance:
Unlike some wireless technologies, G.hn maintains a stable connection with minimal interference, ensuring a consistent network experience.

While G.hn offers a broad range of benefits, its performance can vary depending on the quality of the wiring used, which may impact overall speed and reliability. Power lines, in particular, can be more prone to noise and interference, affecting the consistency of the connection.

FEATURES AND BENEFITS OF MoCA TECHNOLOGY

Coaxial Cable Utilization:
MoCA is built to operate over coaxial cables, a medium that is widely available in most homes and apartments with cable TV subscriptions. This simplifies installation for providers, as they can deliver fast internet without needing to run new cabling. For MDUs with existing coaxial cable, MoCA is easy to install.

Faster Speeds and Improved Bandwidth:
MoCA 2.5 supports speeds up to 2.5 Gbps, making it ideal for bandwidth-intensive activities like 4K streaming, online gaming, and large file transfers. It also helps overcome the limitations of Wi-Fi, which can be affected by distance, interference, and walls, by providing a wired connection with consistent speeds.

Reduced Latency and Lag:
MoCA offers lower latency connections compared to Wi-Fi alone. This translates to a smoother, more responsive experience, making it ideal for real-time applications such as online gaming and HD video streaming.

Enhanced Wi-Fi Performance:
MoCA can act as a backbone for the Wi-Fi network, improving coverage, reducing buffering, dropped connections, and eliminating dead spots. By providing a strong wired connection, MoCA allows Wi-Fi devices to connect at faster speeds and with better reliability.

Easy Setup and Installation:
MoCA adapters leverage existing coaxial cables, eliminating the need for new wiring or drilling holes. Most MoCA adapters are plug-and-play, making them easy to set up and use. It typically requires little more than connecting MoCA adapters to the coaxial outlets in the home, making it a low-cost and low-labor solution.

Although MoCA provides excellent performance, it is limited to homes and buildings that already have coaxial cable infrastructure. This makes it unsuitable for environments without coaxial wiring or where existing coaxial networks are outdated.

CONCLUSION

Both G.hn and MoCA are effective networking solutions that leverage existing infrastructure to provide high-speed internet connectivity. G.hn stands out for its versatility, supporting multiple wiring types, while MoCA is ideal for homes and MDUs with existing coaxial networks. Understanding the strengths and limitations of each technology will help broadband providers make the right decision based on the specific needs and infrastructure of their customers' buildings.

Not Sure What's Right for You?

We can help you look at your options and can advise you on which technology would be best for your specific situation. Just give us a call at 800-909-9441 or send us an email at info@zcorum.com.

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