



G.hn, Any wire Communications throughout the Connected Home

Frequently Asked Questions

What is G.hn?

G.hn is a technology defined by a family of international standards created by the UN's ITU-T standardization body. G.hn is defined to operate over any physical networking medium in the home, such as coaxial cable, telephone wires, CAT5 cables, and powerline. G.hn even works over plastic optical fiber! The "any wire" nature of G.hn means that a single technology interconnects any device in the home over any wire. G.hn systems can pass data at very high speeds, up to at least 1 gigabit per second. Combining very high throughput with a very robust quality of service mechanism and complete security enables G.hn networks to meet Service Provider requirements. G.hn provides an in-home network that is secure from tampering or content theft while able to deliver any content anywhere throughout the home.

Why is G.hn important?

Prior to G.hn, home networks were either Ethernet-based requiring new cables or they were based on proprietary technologies that did not enjoy widespread adoption, were expensive and were known to have service or throughput issues. G.hn has consolidated the wired portion of the home network under a single technology. G.hn eliminates the need for new wires, is very cost effective, and provides the high throughput and quality of service backbone for today's hybrid home network. Based on a G.hn wired backbone network, the in-home network can deliver high bandwidth content anywhere for fixed or mobile devices, supporting wireless links between nomadic devices in the home with very high speed links for the larger systems, like TVs, set top boxes (STBs), and gateways, which require the throughput and quality of a wired connection.

Who will benefit from G.hn?

The whole eco-system benefits, from Service Providers to retailers to equipment suppliers to consumers:

Service Providers – gain a secure and high capacity in-home network for the content they deliver; ensuring top service metrics, low cost, customer self-installations, and high customer satisfaction, while G.hn security ensures the network and its contents are protected. Further, with the increasing population shift into high-density multi-dwelling unit buildings, there is the need to ensure that multiple networks on the same wires, such as powerlines, will not cross-interfere. G.hn has this capability, which is unique versus its competition, and which enables Service Providers to install G.hn networks without the interference hassles encountered with other technologies.

Retailers – retailers gain through the elimination of the cost of returned products. Prior to G.hn there were three different PLC technologies on the market, two coax technologies, etc. None of these interoperated and several of them were marketed as high speed but typically performed poorly, especially for high quality of service content. G.hn systems from any vendor interoperate with G.hn systems from any other

vendor; the HGF logo on boxes assures the retailer they are offering certified systems that interoperate and perform to a high standard, thus the retailer can expect increased buyer satisfaction and lower returns.

Equipment suppliers – gain through the ease of incorporating G.hn network interfaces (nodes) into their systems. The same software that runs a G.hn node for powerline is the same that runs it for coax or phone line. This allows system developers to “design once, sell many,” which reduces their costs and software complexity. Also, with G.hn performance so high, designers can add it into their systems to differentiate them for minimal cost while providing extensive consumer benefits.

Consumers – gain from not needing new wires, having a secure network that is safe from attacks while their data is protected, and having a network capable of providing high-speed links to any part of the home. Further, based on the advanced nature of G.hn and its designs, the consumer enjoys a simplified installation process that is literally plug and play. And, lastly, due to the ever growing group of silicon and system companies involved, the consumer will have many choices for G.hn options when they go to add to their network.

What are the implications of G.hn home networking from the consumer point of view?

The advent of G.hn means that consumers will see three changes in their home network, bringing significant improvements, while understanding a fourth one that will increase their peace of mind:

1. The network will run much faster, and the home network will no longer be a bandwidth bottleneck. There will be extremely fast intra-home networking speeds (up to 1 Gigabit/second) and access to the Internet will be limited only by the Service Provider’s link, be it cable, satellite, fiber or DSL. The users' perceptions of how files transfer and Web pages load will be quite good, with a high quality of experience. And this is not only due to G.hn's data rate, it's also due to G.hn's error-free communications abilities. By eliminating or vastly reducing retransmissions of information to correct errors, the net throughput is dramatically increased while latency is kept low, thus adding to the perception that the speed is far better.
2. Networking will be much more stable. Albeit begrudgingly, many end users have gotten used to choppy or pixilated video over their home networks. G.hn eliminates the need to accept poor quality networking with its robust set of automatic error detection and mitigation mechanisms, as well as its ability to dedicate specific bandwidth to certain data streams going over the network, resulting in clear video delivery and an excellent Quality of Experience (QoE) for the end user.
3. The technology enables more content. This is a derivative of having a higher quality and faster home network. The consumer will be able to have more, and richer, content choices that they can experience due to the nature of G.hn (faster, more reliable, and more secure). Faster speeds and greater reliability are readily apparent improvements consumers will "see for themselves."
4. Consumers will be able to have peace of mind in regards to their data being secure over their networks with G.hn’s advanced security mechanisms. From AES 128 bit encryption to point-to-point security, G.hn is by far the most secure network choice for the home.

What are the implications for telecoms Service Providers developing 'Connected Home' competencies?

The advent of G.hn has four main implications for such operators:

- 1) There's the ability to manage and monitor service down to the terminal device in the home, enabling fast network trouble resolutions.
- 2) Secure delivery of content is crucial. The nature of G.hn's secure communications enables services providers, those that deliver licensed and restricted content to the home - be it as a Service Provider set of channel choices or an OTT type service subscribed to and reached via Web browsing, to be confident that the content they deliver will be consumed on the intended device only and not pirated in some fashion, either within the home or by an outsider.
- 3) Higher consumer satisfaction with the service means a 'stickier' relationship, therefore less customer churn.
- 4) Customer self-installs means no truck rolls, lower costs, and faster service turn up. G.hn, with its plug and play capabilities, enables customers to be shipped their networking package, install it themselves, and get up and running immediately. With G.hn's neighboring networks interference mitigation, even those customers in high-density multi-dwelling unit buildings with many networks over the same mediums in close proximity will not encounter a problem when they go to install their G.hn network.

FAQ's on G.hn-MIMO

What is G.hn-MIMO?

MIMO is a concept for using multiple transmit and receive paths to send data between two devices. By using multiple paths the data between devices is sent in a more robust fashion, improving quality of signal, higher throughput, and longer reach. Applying this concept to powerline takes place when there are three wires to sockets in the home. A G.hn powerline node with MIMO sends multiple signals over the wires to the receiving node that has multiple receivers inside. See the HGF white paper on MIMO.

Why is it important?

G.hn signals using MIMO produce a more robust signal resulting in less errors on the line, higher throughput, and better coverage throughout the home at higher data rates. What the end user experiences is higher speeds, no errors for any content, and a stronger network throughout their residence.

What is cutting edge about the technology?

MIMO has heretofore been a wireless technology. This enhancement to G.hn is the first standard for MIMO over powerlines. And, this technology addition to G.hn is already available from some silicon providers.

Who will benefit?

Service Providers benefit, as the network is more robust to noise and can carry even higher bandwidth content. The end user quality of experience will be as high as possible given the improvements from MIMO, as well.

What are the implications of G.hn-MIMO for the component community?

As G.hn technology is fully defined and can stand alone based on Recommendations G.9960 and G.9961, the ITU-T determined that the addition of MIMO capabilities to G.hn transceivers was an optional enhancement that should be in a new standard. The addition of MIMO provides silicon companies with the option to develop products that extend G.hn and help grow the market. The definition of MIMO for G.hn is a straightforward addition to the technology, not a replacement. This means that there is full compatibility and that even non-MIMO nodes in a network benefit when communicating with a MIMO node.

What does the future hold for this technology?

The leading technologists involved in G.hn are busy evaluating how to make this enhancement even better. One of these is the use of “virtual wires” created through algorithms that make the three wires between sockets seem like more so that more improvements to signals are possible.

Further, MIMO is being evaluated for use over other wire types, such as regular copper cables (telephone wires, CATx cables, and other cables). As G.hn works over any wire, expect to see G.hn MIMO enhancements not limited to powerlines.