



Frequently Asked Questions

Revised 28 May 2013

about **HomeGrid Forum**

HomeGrid Forum (HGF) merged with the HomePNA Alliance in May 2013, forming an industry alliance of over 70 members including some of the world's largest Service Providers, system manufacturers, and silicon companies. HGF promotes development and deployment of a single, unified, multi-sourced home networking technology, G.hn, over coax, phone wires, powerline, and plastic optic fiber while continuing to support the existing base of HomePNA deployments. HGF provides silicon and system certification through its compliance and interoperability testing programs to ensure that retail customers and service providers can have confidence in all G.hn and HomePNA products.

HGF members collectively provide an eco-system covering all aspects of the technology from Retailers to Service Providers, utilities to Smart Grid think tanks, system developers to test houses and silicon companies. Our goals include promoting the benefits of G.hn; enhancing G.hn technology to meet evolving industry requirements; ensuring interoperability, performance based on our certification program; and supporting the needs of Service Providers deploying G.hn and HomePNA technologies.

For more information on HomeGrid Forum, please visit our website at
<http://www.homegridforum.org>



HomeGrid Forum Certified G.hn Products

The mark of Certified Compliance, Interoperability, and Performance



HomeGrid Certified HomePNA Products

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Note

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Key Messages:

HomeGrid Forum (HGF) is focused on evangelizing, extending and certifying ITU-T G.hn-based products, supporting the interests of Service Providers, Consumer Electronics manufacturers, PC manufacturers, and other networking companies to roll out this revolutionary, single MAC/PHY technology for transporting HD multimedia streams across a home's existing coaxial, phone line, twisted pair and powerline wires as well as over plastic optical fiber.

Highlights:

- G.hn is a standardized technology whose networks enable Service Providers, consumer electronics companies, PC makers and consumers to connect all types of devices via any wire in the home – coax cable, phone lines and power lines
- Support for G.hn is growing as evidenced by its rapid progression from silicon prototypes to systems ready for certification and deployment
- HomeGrid Forum is working actively to promote the G.hn technology, certify G.hn silicon and system products, and expedite the roll out of deployments globally
- HomeGrid Forum certified the first silicon in November 2012 and more in May 2013, while announcing that the test lab is now ready to perform system testing for certification

Question and Answer:

G.hn FAQ

Q: What is the International Telecommunications Union (ITU)?

A: The ITU is a global standards body under the auspices of the United Nations. Comprising more than 190 member countries and hundreds of member companies, the ITU sets standards for global networks. The ITU's Telecommunications Sector (ITU-T) produces more than 200 standards (Recommendations) each year in the converging areas of telecommunications, networking, information technology, consumer electronics, broadcasting and multimedia communications.

Q: Where is G.hn in the standardization process within ITU-T?

A: The G.hn family of standards is complete: The ITU-T has finalized G.hn Recommendations (the ITU-T term for standards) for the Physical Layer (PHY) and network architecture portion of the standard (G.9960), the DLL (G.9961), the management plane (G.9962), the addition of MIMO to G.hn's powerline communications (PLC) mode (G.9963), PSD specification and tools (G.9964) and G.cx (

G.9972) defining coexistence between G.hn in PLC mode and other PLC networking technologies. Work continues in the ITU-T on extending G.hn and on other complementary standards including G.hnem, a technology that to extend many of G.hn's benefits in a lower power, lower complexity package for home automation and smart energy management.

Q: What is included in the PHY and DLL for G.hn?

A: There are three elements in both the PHY and DLL for G.hn. The PHY includes the sub-layers: the physical coding (including forward error correction scheme); the physical medium attachment for frequency, timing and redundancy; and the physical medium dependant items for networking over coax, powerline, phone lines, twisted pair, and plastic optical fiber. The Data Link Layer (or DLL) includes the sub-layers: the application protocol convergence interface; the logical link controls for data retransmission, relaying and security; and medium access control. As G.hn is in effect a virtual bridge in that any node in a G.hn network can communicate with any other node, without the need for a bridge, router, or switch. The G.hn DLL definition includes the link layer control (LLC) sub-layer to facilitate this virtual bridge while G.hn networks and or individual nodes appear as standard Ethernet transceivers to upper layer applications, including the LLC sub-layer in an Ethernet bridge, which is above the G.hn node.

Q: What is G.9972 or G.cx?

A: G.9972 is a complementary but separate Recommendation. It defines how G.hn devices can coexist with other powerline devices such as the IEEE P1901 technologies and others that also adopt the G.cx coexistence protocol (ISP). G.hn also has coexistence mechanisms that allow it to detect “alien” or non-G.hn signals on a medium that it is operating over and adjust or shift the node’s spectrum usage or transmit power to facilitate coexistence with those other technologies. This capability also allows G.hn to coexist with broadband access technologies such as VDSL2, used by many Service Providers to deliver IPTV to their subscribers.

Q: What is the real-world performance of G.hn?

A: G.hn has a single input, single output (SISO) PHY rate of up to a Gigabit per second. G.hn performance – based on demonstrations of G.hn prototypes – is three to five times higher than existing generations of coax, powerline and phone line networking technology. G.hn PLC mode with MIMO is able to achieve approximately 1.7 times the SISO PLC mode for G.hn, achieving approximately 800 megabits per second throughput over powerlines. As systems are now (Spring 2013) rolling out to market, we anticipate that independent lab tests and head to head evaluations will occur that reconfirm that G.hn is by far the most robust and capable home networking technology available today.

Q: Who benefits from G.hn?

A: Because the G.hn standards are aimed to deliver a single unified home networking technology that can run over coax, powerlines, phone lines, twisted pair and plastic fiber, the whole market benefits. As the same G.hn silicon can operate over any wired medium, the volumes for all mediums are cumulative, meaning that the ability of G.hn to reach mass market volumes and foster a growth market for the technology is huge and will be rapidly achieved. This benefits all levels of the market. Silicon companies vie for a larger market and have opportunities to focus on large niches where they can specialize and differentiate. System companies have a broader base and lower costs due to silicon competition and the volumes of G.hn. Service Providers have a broader supply chain with multiple sources to select from that ensures lower costs, the ability to drive adaptations to their needs and innovation driven by competition. Consumer electronics companies benefit through a broad installed base of G.hn networks enabling faster uptake on G.hn enabled systems and the cost erosion brought about through the mass market and silicon competition. Retailers benefit through fewer returns as G.hn systems will interoperate and perform better than any competing wireline technology. Consumers benefit through high quality of service, excellent quality of experience, and simple plug and play installations.

Q: What is HomeGrid's vision for G.hn-based devices? How will consumers use these products?

A: Before we touch on products, we want to share our vision of the home network. It will be a hybrid network consisting of wireless (802.11) for nomadic devices, low bit rate wireless and wireline technologies for energy management and Internet of Things devices, and G.hn as the wired backbone for the network. G.hn, with its robustness to noise and ability to deliver high quality services anywhere there's a wire in the home, provides the strength of an underlying network able to tie the others together while also enabling very high data rate services delivery to major CE devices, set top boxes, and wireless extenders in the home, for example. Products using G.hn are dramatically transforming the digital home. With increasingly intelligent devices – and the ability to connect these products using any wire, anywhere in the home – people are free from the hassles typically associated with installing and using consumer electronics. Imagine doing no more than plugging your DVR into coax jack to be able to watch it on any TV in your home instantly. Plug your PC into any outlet and have high-speed access to the internet via the powerlines. Dock your iPod and immediately listen to music outdoors with no special wiring required. These experiences and many more will become much easier with G.hn and HomeGrid.

Q: When will the market see G.hn products?

A: Certified silicon is now available from multiple sources. Spring 2013 will be when certified system products start to be available. HomeGrid Forum believes that more

than a billion products shipping each year are candidates for G.hn. These include: televisions, game consoles, DVRs and other consumer electronics products; personal computers and peripherals; networking devices including gateways, routers and switches; and Smart Energy products including power meters, appliances, security products, HVAC and other products.

Q: Tell me more about G.hnem

A: G.hnem extends the G.hn promise of any wire home networking with a narrowband powerline implementation (lower frequency and performance) than G.hn. While G.hn was defined for networking multimedia content around the home is used in applications such as home automation and home energy control, in appliances, thermostats, lighting and elsewhere in the emerging “Home Grid” of the Internet of Things.

HomeGrid Forum and ITU-T Background Q&A

Q: What is HomeGrid's market relevance?

A: HomeGrid Forum was established as an industry group focused on evangelizing the benefits of G.hn technology, driving innovation in the technology and also maintaining a compliance and interoperability program that ensures products comply with the G.hn standards and also pass strict interoperability requirements. Products that meet the compliance and interoperability requirements are awarded a HomeGrid logo for use on their products and related literature.

Q: Does HomeGri

Q. Does HomeGrid Forum create specifications?

A: Yes--the goal of HomeGrid Forum is to support the development of standards in ITU-T; however, there are many aspects to home networking that are outside of scope of ITU-T work. This is where HGF specifications come in. As well, as HGF is comprised of experts in the field of home networks and G.hn, they collaborate continuously on extending the technology into new areas and functionalities, creating HGF specifications for these new advances.

Q: How do consumers benefit from HomeGrid Forum efforts?

A: Products based on the ITU-T G.hn specification are far more robust and capable than legacy network technologies in use already. The consumer benefits from the improved performance of their home network, peace of mind in the simple installation steps needed to set up the network and add devices to it, and a highly competitive market place where G.hn products are available from multiple manufacturers, significantly placing downward pressure on costs while driving innovation.

Q: What's next for HomeGrid Forum?

A: HomeGrid Forum just merged (Spring 2013) with the HomePNA Alliance, more than doubling the size of HGF and adding several top companies into our growing list of members. We will continue to support the expanding HomePNA base while providing a well-documented means to migrate these HomePNA deployments to G.hn over time, thus maximizing the return on investment in HomePNA while smoothing the transition for Service Providers to G.hn. On the G.hn side, HGF is working in several regions of the globe to assist Service Providers in finalizing their plans to roll out G.hn, through assisting in their C&I testing, their RFP generation, and their interactions with local regulatory bodies to ensure G.hn is not only the best technology used in the home networks but the one with the lowest interference to other services.

Q: Does HomeGrid Forum seek association with any other alliances?

A: Yes, in fact, HomeGrid Forum has signed liaison agreements with other industry alliances to facilitate exchange of ideas as well as collaborate on specific issues. HomeGrid liaisons include: the Digital Living Network Alliance (DLNA); The Broadband Forum; ZigBee Alliance; and others.

Q: How does HomeGrid Forum relate to ITU?

A: HomeGrid Forum is a separate organization from the ITU, one of the world's foremost standards development organizations. ITU is one of the specialized agencies of the United Nations, and more than 190 member states and over 700 sector members representing public and private companies and organizations that cooperate on the development of telecommunications and network standards and the harmonization of national telecommunication policies. The ITU-T is the standardization arm of ITU, and is the pre-eminent worldwide telecommunication standards body. HomeGrid's charter is to support the development and implementation of the ITU-T G.hn standard, promote its use, and drive important compatibility and interoperability testing thereby ensuring optimal consumer purchasing and installation experiences.