



for any wire, anywhere in your home

G.hn & HomePNA Coax Options Today

Adding G.hn to HomePNA deployments

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	page
1 Introduction	3
2 Interoperation	3
3 Coexistence and G.hn as an Overlay Network	4
4 G.hn Adjunct Networks	5
5 Network Selection	5
5.1 HomePNA is not already deployed	5
5.2 HomePNA already deployed	6
6 Conclusion	7

Note

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1 Introduction

There are several possibilities for selection of which technology to deploy today. The term “today” used here as sometime between the present and the end of 2013.

This paper summarizes the options a Service Provider has at present, from interoperation to coexistence and overlay networks, to adjunct networks, and finally to choices given the existing deployed base and future service plans.

The options for Service Providers in this scenario break down to:

1. Meet today’s needs with the HomePNA service platform
2. Set up/introduce tomorrow’s service platform today
3. Move to tomorrow’s service platform today

Selecting the first option, the Service Provider is confident in the data handling needs of the HomePNA networks deployed to handle demands within the established time horizon and the extent of coax coverage in the home is sufficient to meet anticipated user requirements.

Selecting the second option is covered substantially in the sections following. The Service Provider has several choices to select from; picking the one that best suits the requirements determined as part of service planning.

The third option is possible for greenfield as well as established areas with HomePNA service, and is discussed in the sections below.

There are two network configurations discussed following, coexistence with an overlay network, and the use of G.hn as an adjunct to a HomePNA network.

2 Interoperation

(Where two different technologies’ devices can communicate directly on the same medium)

The two technologies are quite different, and to date there is no defined means for nodes from each technology to form a single network where there is no need for bridging between the two. To develop interoperation would take a lengthy period to define, build silicon, and test while the cost for all of this work may not be recouped due to time to market and other factors.

Sigma Designs has announced dual mode chips, HomePNA and G.hn. These are designed to operate exclusively in one mode or the other, not switch between them in real time and not for concurrent operation as if these are two-port chips. They would not allow for a single mixed technology network. However, these would provide Service Providers with a means of planning a migration path over time to G.hn. This approach has been tried in the past with other technologies and proven to be effective if managed properly. There are technology hurdles and long-term base management issues that can be overcome, but up-front planning, execution, and testing are required. Dual mode devices can also be used in a coexistence mode deployment, but would still require a bridge to link the two networks.

3 Coexistence and G.hn as an Overlay Network

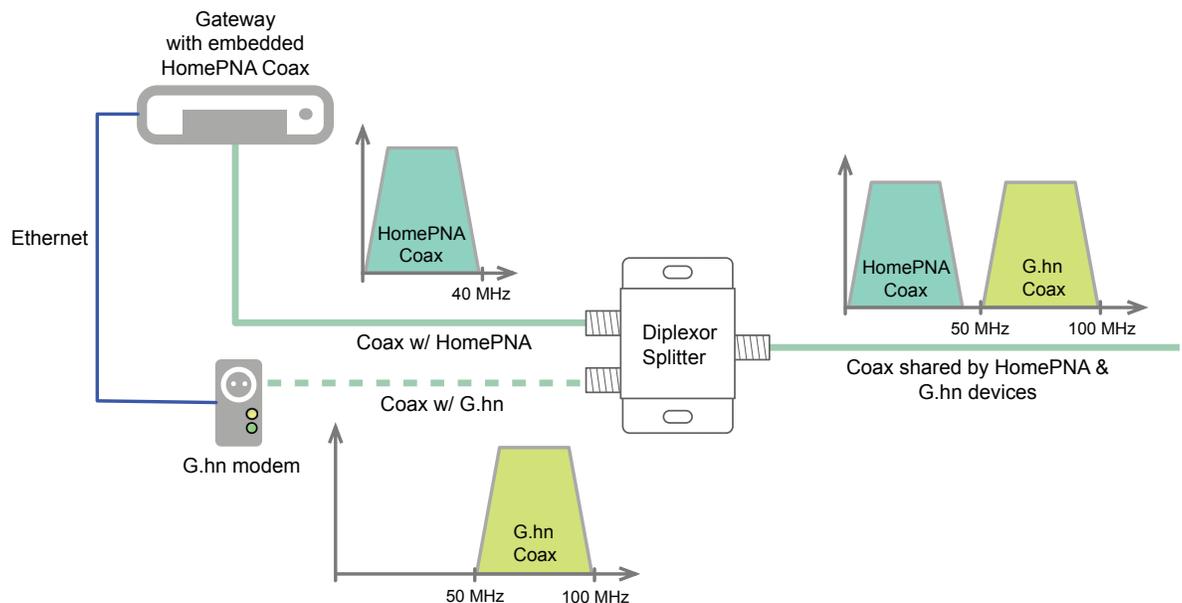
(Concurrent operation over the same medium, without interoperation, where one network (G.hn) operates in a frequency range above the other network)

G.hn has two modes for coax operation, Baseband and RF modes. G.hn Baseband operates in the 5 to 100 MHz range while G.hn RF operates in the 300 MHz to 3 GHz range. HomePNA generally operates over coax up to 44 MHz.

If G.hn BB coax service was configured to operate between 50 and 100 MHz, then concurrent HomePNA/G.hn coexistence on the same wires would be possible with G.hn as an overlay network. However, filtering at each network device may be needed, with any previously installed HomePNA devices possibly needing an added filter between it and the coax jack to block the higher frequency signals. Layer 2 bridges are required to enable the two networks to intercommunicate.

With G.hn RF, since the two technologies operate in vastly separated frequency ranges, there is no conflict with concurrent coexistence over the same coax. Layer 2 bridges are required to enable the two networks to intercommunicate.

The following Figure provides a simplified view of an overlay G.hn baseband coax network operating above HomePNA.



4 G.hn Adjunct Networks

(Networks operating over different mediums)

G.hn adjunct networks are those operating over powerlines, copper pairs, and fiber. There is no interference with the coax HomePNA network. Layer 2 bridges are required to enable the networks to intercommunicate.

Adjunct networks provide the service provider with a simple migration path towards G.hn, since:

- The physical medium is not shared with HomePNA, therefore complex and expensive filtering circuitry is not required
- G.hn can use the full spectrum (2-100 MHz over twisted pairs or fiber, 2-80 MHz over powerlines), therefore providing increased performance and the same services as currently deployed over coax HomePNA
- Using “simple” G.hn adaptors, with HGF certified ones announced September 2013, reduces the cost burden and deployment time, while certified gateways and STBs with embedded G.hn expected prior to year’s end as an option

G.hn is defined to perform at a high level over any wires, meeting the performance levels required by service providers for their services. Once the HomePNA to G.hn migration completes, G.hn-based baseband coax devices can be deployed to increase the home network’s performance and enable additional services.

5 Network Selection

(What technology to select today)

This section summarizes choices for Service Providers depending on if they have existing HomePNA deployments or not.

5.1 HomePNA is not already deployed

If HomePNA technology has not been deployed already (facing a greenfield environment), and the medium is to be coax, a Service Provider has two choices.

The table summarizes the choices based on primary selection criteria. If the need is immediate (less than 6 months to deploy), HomePNA is the easiest choice. However, if the timeframe to deploy is end of 2013 or later, the choice shifts in favor of G.hn.

» **Table 1:** Selection criteria between HomePNA and G.hn

Criteria for technology selection	HomePNA	G.hn
Field deployed and proven now	Yes	No
Substantial number of certified systems available now	Yes	No
Timeframe to roll out	Immediately	End of 2013
Multi-source silicon	No	Yes
Highest throughput	No	Yes
Best noise mitigation	No	Yes
"Future proof" in extensibility	No	Yes
Will be improved, developed, extended going forward	No	Yes
Amount of improvement since standard adopted	Modest	Substantial
Expected price erosion slope	Near Flat	Higher slope

5.2 HomePNA already deployed

If HomePNA is already deployed, the Service Provider must make a decision to either deploy new networks as G.hn while maintaining existing ones as HomePNA with some transition period (requiring two types of network systems to stock), stay HomePNA fully, or consider mixed technology options.

The following table provides choices to consider. There is also the choice of mixing options below according to the needs and plans for the service area.

» **Table 2:** Existing HomePNA Deployments

Desired Environment	HomePNA	G.hn
Keep a single technology	Stay	
Move new accounts to G.hn	Maintain existing base, convert over time	All new networks
Mix (Coexist)	Maintain	All new network devices are G.hn, bridge links networks, convert old devices over time
Mix (Coexist with dual mode systems added)	Maintain but able to upgrade dual mode	All new networks are G.hn, use HomePNA mode in existing, need a bridge

5.2.1 Coax only option (Coexistence)

As shown in the table above, there is a choice to be made if HomePNA is already deployed. Shift to G.hn for new customers and eventually replace HomePNA networks with G.hn, or go with a G.hn coexistence mode over coax. The coexistence and dual mode options are possible with a bridge still needed to link the two networks.

5.2.2 Any wire option

If any wire may be used, then the coax realm may remain HomePNA with powerline, fiber, or copper pairs used for G.hn. This may be the most opportune methodology for providing any service to any location while continuing to reap benefits from the embedded HomePNA investment.

6 Conclusion

Today, Service Providers have a very capable service platform in HomePNA. If service needs are requiring change or growth to the in-home network, G.hn provides the best path forward for those SPs that want to move to a platform with higher capacity with improved QoS metrics and the same ease of installation.

We have shown above that there are several options to select from for shifting service partially or fully to a G.hn platform. All of the options are available and interchangeable to fit the needs of specific service architectures.

Ultimately, moving to G.hn is the wisest choice for any wired home network. However, there are many options along the way that protect existing investment in HomePNA whilst providing a planned and cost-effective migration to G.hn.