HPNA Optimized Coaxial Splitters

ALL SYSTEMS BROADBAND

White Paper

As broadband services become common in the home, more attention has been placed on the home area network, or HAN. One technology available to utilize the existing home communication wires of both phone line and coax is HPNA. The HomePNA Alliance is an organization that supports the HPNA standard, which is incorporated into residential gateways and set-top boxes for data transport.

The current standard, HPNA 3.1, was adopted in November 2006 and defines four spectral modes for the network.[i] Modes A and B allow for the use of both phone line and coax cables in the same network. The many advantages to utilizing a HPNA network can be found from several sources.

A short list of those advantages is:

1. No special or new home wiring required
2. Can run with most existing services due to a unique frequency spectrum
3. Data rates up to 320 Mbit/sec

These advantages help service providers leverage the wiring found in existing homes with the flexibility to utilize either phone line, coax cable, or both.

Working with a customer we were able to identify an issue where the robustness of the coaxial network when used with typical 75-ohm splitters was insufficient. The passive components of existing coaxial networks operate at an impedance of 75-ohms. HPNA is a rate adoptive technology where data speeds depend on the characteristics of the transmission medium. For the target payload of the customer the insertion loss had to be kept below 35dB for point-to-point transmission in a given path. This is the point where adapting PHY rates drop below 112 Mbit/sec.

Our engineering team determined that in order to optimize the performance of the HPNA network we needed to insure a moderate return loss and isolation to create a low insertion loss for the first splitter in a cascade operating at 75-ohm impedance. The results were significant. In a trial with a

service provider, we were able to record 15 to 35dB improvement depending on the ports measured when compared to a typical non-HPNA optimized splitter. When compared to another resistive splitter designed for HPNA networks found in the market today, we were still able to show improvements in the range of 5 to 15dB.

Lab trials with the customer identified in-home networks that were operating in a marginal unacceptable state could be improved by simply exchanging the first 4-way splitter in the HAN to bring all PHY rates to acceptable levels.

We concluded that by installing the All Systems Broadband HPNA-optimized splitter,[ii] the coax-based HPNA home area network recovered considerable headroom by lowering loss associated with other splitters. Assuming the first splitter is the ASB optimized 4-way splitter, it has been shown that the additional performance can be the difference of accommodating two additional standard 75-ohm 2-way splitters in cascade or not. In general more performance headroom is critical to utilizing the coaxial networks found in homes today when operating in the frequency range for HPNA. This additional loss budget helps HPNA networks tolerate poor coaxial routing and higher loss connectors that might be already in place.

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[i] Reference CopperGate presentation by Dudi_b@copper-gate.com
Spectral Modes measured in MHz
Mode A (4 – 20), Mode B (12 – 28), Mode C (36 – 52), and Mode D (4 – 36).

[ii] ASB HCP-04/H 4-port HPNA splitter

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