

Before the
Federal Communications Commission
Washington DC 20554

In the Matter of)
)
Inquiry Regarding Carrier Current) ET Docket No. 03-104
Systems, Including Broadband over)
Power Line Systems)

Reply Comments of Intellon Corporation

Intellon Corporation is pleased to submit these Reply Comments in response to the comments filed on the Commission's Notice of Inquiry (NOI) regarding Carrier Current Systems, including In-House Broadband over Power Line (“BPL”) systems.

A. Introduction

Intellon Corporation is a fabless semiconductor manufacturer that designs and sells integrated circuits that allow networking and other communications over powerlines. Intellon invented the technology that forms the basis for the HomePlug 1.0 powerline networking specification as well as the technology that forms the basis of the CEBus powerline communications standard, EIA 600.

BPL today involves two different implementations of powerline communications technology: In-Home BPL and Access BPL. We believe it is critical for the Commission to consider the distinction between these two types of implementation when assessing the comments received to date and determining whether any further action by the Commission is appropriate.

In-Home BPL uses powerline communications technology to allow devices in homes and small businesses to communicate over existing electrical wires located primarily within the home or office. Devices compatible with the HomePlug 1.0 specification use this approach to communicate through a home's electric power wires, allowing every power outlet to also serve as a connection to an in-home data network. In-Home BPL is valuable because it offers consumers a simple, cost-effective method of establishing home and small office networks without the cost and disruption of running new wires and without the coverage limitations and installation complexities of wireless or "WiFi" systems. In-Home BPL networks can be used for such applications as Internet sharing, data transfer, audio connections, online gaming, and security camera monitoring. In-Home BPL competes with other home networking technologies such as WiFi, wired Ethernet and home phone line (HPNA). The radiation limits in the Commission's existing Part 15 Rules have successfully controlled the interference potential of these existing devices to licensed services. This fact is evidenced by the substantial number of HomePlug-compliant devices already deployed in the field with no reports of harmful interference. There is no need for additional regulation. HomePlug encourages the FCC to consider only relevant, recent data for interference potential analysis, none of which demonstrates harmful interference to licensed services by HomePlug-compliant devices.

Access BPL systems use powerline communications technology to deliver a broadband signal to a home or small business. Access BPL systems may use powerline communications only over the last mile or half-mile of transmission, typically using radio frequency or optical fiber over longer distances. Some Access BPL systems use powerline to go from the transformer into the home. Others use powerline to reach the transformer and use

wireless to go into the home. Regardless of the distance covered and delivery approach used, Access BPL systems provide new and direct competition with providers of DSL and cable service. As such, they offer the prospect of more pervasive and cost effective broadband deployment. Because of the diversity and geographic distance covered by some proposed Access BPL systems, it may be appropriate for the Commission to consider the establishment of radiation measurement procedures for Access BPL systems. However, any such procedures should be based only on radiated emissions. In addition, the development of such new procedures should not prevent continued deployment of Access BPL systems under existing procedures in the interim.

B. In-Home BPL

1. Existing Part 15 Rules Work

No need exists for additional regulation of In-House BPL by the Commission. The regulations that exist today in Part 15 have protected against interference with licensed services while providing freedom for innovation. These concepts were summarized well by Information Technology Industry Council in their comments. “The Commission’s Part 15 Rules continue to provide a balanced approach to spectrum allocation, interference protection, and provide stability for manufacturers to design products that will integrate and operate efficiently with existing systems resulting in more long term value for the consumer.”¹

One of the great strengths of the current regulatory scheme encompassed in Part 15 of the Commission's Rules is that it provides incentives for manufacturers to avoid causing

¹Comments of Information Technology Industry Council at page 5.

interference when creating new products as well as safeguards to correct the problem if interference does occur. Manufacturers recognize their obligation and responsibility to correct any interference situations that result and obviously strong business incentives exist to avoid this significant burden through design of products that avoid creating interference in the first place. The FCC Rules provide protection from interference and allow innovative new products to benefit millions of consumers.

2. Radiated Emissions Testing

A broad array of respondents commented that radiated emissions testing is appropriate for compliance verification of In-House BPL devices. Some, however, requested alternate emissions measurement techniques to ease the burden of emissions measurements, such as extrapolation from conducted measurements. The Part 15 rules include radiated emission limits designed to prevent interference with licensed services. It may be possible to develop a conducted emissions test that would reduce the effort required for emissions testing, however, measurement of radiated emissions will always be the most reliable indicator of interference potential. Although alternate measurement methods could be investigated, and if sound, made available as an alternate technique, the existing measurement methods and standards using radiated emissions should always be permitted.

As noted in our Comments, stability in the rules best serves the needs of the nascent In-House BPL industry as well as the overall public benefit. This interest is no different than that of licensed spectral holders, as rapidly shifting spectral allocations diminish the incentive for investment in equipment to utilize the allocations. Stability in rules of measurement and regulation also allows manufacturers and service providers to optimize their equipment and

services to create business opportunities and effective services for the public. This is particularly important for a developing industry such as HomePlug, where unanticipated changes or uncertainty in applicable rules could effectively destroy an important emerging technology with significant consumer and competitive benefits. We urge the Commission to retain such stability in the rules.

3. In-House BPL is Being Widely Deployed Without Problems

A few respondents have expressed concern over the interference potential of BPL devices to licensed services and the desirability of field study prior to widespread deployment of BPL devices. At present, 17 companies manufacture 58 different products that comply with the HomePlug standard. In addition, a number of manufacturers have announced new types of products. These products include adapters that allow a home's existing powerlines to replace the need for installing costly new Ethernet cables for in-home networking and Internet access sharing, devices that bridge In-Home BPL to WiFi access points in order to extend the range or allow for optimum placement of in-home wireless networks, Powerline cable/DSL routers², and gateway devices that include Powerline + DSL³, and Powerline + cable modem⁴. Later this year, other manufacturers are expected to announce desktop personal computers, audio players and security cameras equipped with built-in In-Home BPL using HomePlug 1.0.

Intellon has significant experience in assisting its customers' design and bring to market consumer products using HomePlug 1.0-complaint technology. Intellon is not aware

² Asoka PlugLink Powerline Cable/DSL Router – PL9920-BBR, <http://www.asokausa.com/news/router.php>.

³ Efficient Networks Powerline/Wireless DSL Gateway - SpeedStream 6400, <http://www.efficient.com/press/200307071.html>.

of any complaints of interference caused by HomePlug compliant devices. This U.S.- based experience is the most relevant to showing the limited potential for interference.

In fact, joint testing by ARRL and HomePlug demonstrated the very low probability of interference between HomePlug devices and amateur radio use. Despite this well publicized study⁵, many respondents cited potential In-House BPL interference with amateur radio as a significant concern. Additionally, computer models generated by ARRL and offered in their comments claim interference levels significantly higher than that experienced in their own testing. Accurately modeling the radiation of In-House BPL signals is highly challenging due to the complex interactions between the wiring and switches in a home, a difficulty in fact cited by ARRL in their Comments⁶. Despite this fact and the lack of agreement between modeling results and actual field data, these studies are exclusively cited as being authoritative on potential interference. This effectively distorts the facts and does not materially contribute to the public record. HomePlug encourages the Commission to use realistic interference analyses and data from present deployments in their consideration of In-House BPL.

4. No Impact From In-House BPL on DSL or Cable Equipment

Several respondents, including cable and DSL service providers, have commented on the interference potential of BPL on existing cable and DSL networks and equipment. Intellon

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⁴ ARRIS Touchstone Data Gateway 400 (DG 400), <http://www.arrisi.com/press/pressdetail.asp?id=127>.

⁵ HomePlug & ARRL Joint Test Report, January 24, 2001
http://www.arrl.org/tis/info/HTML/plc/files/HomePlug_ARRL_Dec_2000.pdf.

⁶ Comments of ARRL at page 15: “The only reasonable conclusion is that it is not possible to determine the interference potential of BPL wiring with a computer model.”

has seen no interference to these systems in any of our tests, and we also have not had any reports of interference from any users of the substantial number of HomePlug compliant devices already sold. We are not aware of any data to support interference or potential interference to cable or DSL equipment, and no data was provided by any of the commenters indicating otherwise. Several equipment manufacturers have also announced products that combine a HomePlug based Powerline interface along with a cable or DSL interface (see references above) and Intellon is working with other manufacturers who intend to announce similar products in the near future. These manufacturers have a significant economic interest in ensuring that their existing broadband modem business is not adversely affected by interference from any sources. The fact that these manufacturers are bringing out HomePlug compliant products after internal evaluation and testing provides significant evidence that there is no meaningful potential for interference between these technologies. Intellon is also working with a number of large service providers that are evaluating use of HomePlug compliant products for such purposes as in-home networking and the installation of DSL and cable modems. Intellon is not aware of any interference issues resulting in the course of these evaluations. To the contrary, Intellon expects to see HomePlug compliant products deployed by several major service providers within the next several months.

5. No Solution Required for In-House BPL Interference

Comments were made by several respondents suggesting that Wi-Fi offers a “solution” for the alleged concept of In-house BPL interference. We believe that these comments are misplaced, and represent an effort to further the dominance of the WiFi industry against the emerging competitive impact of In-Home BPL generally and HomePlug in particular. As noted elsewhere in these comments, no real world support exists for any

meaningful interference caused by In-House BPL. In addition, according to a study published in IEEE Communications Magazine, In-House BPL networks have unique advantages over Wi-Fi in coverage, reliability and stability, features which are important for home networks.⁷ Ironically, one of the popular uses of HomePlug compliant products is to eliminate the dead spots and interference that sometimes exist in in-home WiFi networks. HomePlug compliant products are also easier to set up and use than many WiFi products, making HomePlug products important in allowing the mass consumer markets to share Internet access. The next generation of HomePlug powerline communications technology, HomePlug AV, a 100 Mbps class home networking technology, is expected to offer significantly greater bandwidth than any available in-home WiFi technologies, thereby allowing networking of multiple HDTV streams throughout the home. We believe it is important to allow WiFi and In-Home BPL technologies to compete in the marketplace without undue regulatory impediments.⁸

C. Access BPL

1. Advantages of Access BPL Outweigh Competitor Claims for Delay

Broadband coverage in the United States remains low. DSL and cable providers currently control a significant portion of all broadband deployments. Access BPL offers a competitive solution that offers the prospect of substantial benefits to the public. Access BPL systems providers are deploying trial systems, with good results to date. It would be a

⁷ Y Lin et al., “A Comparative Performance Study of Wireless and Power Line Networks”, IEEE Communications Magazine, April 2003.

⁸H. A. Latchman & L. W. Yonge, “Guest Editorial, Power Line Local Area Networking”, IEEE Communications Magazine, April 2003.

mistake for the Commission to delay deployment of these systems pending further evaluation and rule making.

2. Part 15 is Adequate to Cover Initial Access BPL Deployments

For many years, the Commission has successfully used Part 15 to prevent interference by establishing emissions limits reasonably calculated to protect other spectrum users. This same approach should be adequate to allow further deployment of Access BPL solutions. The public utilities involved in deploying Access BPL systems have a strong economic interest in ensuring that any system they deploy is safe and consistent with the public interest. Part 15 contains the appropriate incentives, penalties and enforcement tools to induce utilities and other users of BPL Access systems to comply with the Commission's emission limits and prevent harmful interference to other spectrum users.

3. Access BPL Emission Limits Should be Based Solely on Radiated Emissions

Access BPL emission limits should be based only on radiated emissions. Conducted emissions have no bearing on interference, outside the AM broadcast band and thus should not be regulated at all. Even an implementation that results in high conducted emissions should be permissible as long as the radiated emissions stay within limits.

4. Rule Making Should Encourage Rapid Development of Access BPL

Access BPL offers substantial competitive benefits to the public. BPL has the capability to bring broadband coverage to new areas. In areas already served by broadband, the competition provided by Access BPL offers the prospect of improved service and reduced costs. Unlike the situation involving In-Home BPL devices where we believe that no further rule making is necessary, we believe that further clarification in the regulatory scheme may be

required to cover the full range of Access BPL deployments that may be contemplated by industry. We urge the Commission to issue a Notice of Proposed Rule Making for Access BPL systems and adopt new rules that will promote the mass deployment of Access BPL systems.

Conclusion

The Commission's existing Part 15 rules offer an effective regulatory scheme to protect licensed spectral users while also offering opportunities for innovation by manufacturers and service providers. The proven history of this scheme and the substantial benefits of regulatory stability should be accorded substantial weight. There is no reason for the Commission to make any modifications to its rules relating to In-Home BPL devices because radiated testing of those devices already provides the best mechanism to verify compliance with regulatory limits and there is no substantive evidence of interference caused by any of the thousands of these devices already being used in homes throughout the United States. However, because of the range of Access BPL system designs, the Commission should consider additional rules clarifying the emission standards applicable to those systems. In the interim, Part 15 provides a reasonable basis to allow continued trial deployments of Access BPL systems.

Respectfully Submitted,

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