

**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of

Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems

Carrier Current Systems, including Broadband over Power Line Systems

ET Docket No. 04-37

ET Docket No. 03-104

To: The Commission

**Reply Comments of Arkados Group, Inc.**

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Arkados Group, Inc. (“Arkados”)<sup>1</sup> submits these reply comments in response to the Commission’s Request for Further Comment and Further Notice of Proposed Rulemaking (“Further Notice”)<sup>2</sup> following remand from the U.S. Court of Appeals for the D.C. Circuit<sup>3</sup> with regard to continued use of the extrapolation factor in Section 15.31(a)(2) of the Commission’s Rules<sup>4</sup> for Access Broadband over Power Line (“Access BPL”) measurements. Like Arkados,

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<sup>1</sup> Arkados is a publicly traded Power Line Communications (PLC) chip, communications software and application software manufacturer ([www.arkados.com](http://www.arkados.com)). It has been in business since 2004, and many of our employees have been in the PLC business since 1997.

<sup>2</sup> See Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems, Request for Further Comment and Further Notice of Proposed Rule Making, 24 FCC Rcd 9669 (2009).

<sup>3</sup> *American Radio Relay League v. F.C.C.*, 524 F.3d 227 (D.C. Cir. 2008).

<sup>4</sup> 47 C.F.R. § 15.31(f)(2), (f)(5).

all but one commenter urge the Commission to retain the existing extrapolation factor.<sup>5</sup>

Retaining the current rule without change is well justified by the technical record compiled in this 5-year-long proceeding and it should be affirmed promptly. Settling the uncertainty inherent in the constant consideration of this issue will permit industry to move forward to invest in this innovative technology without fear of the rules being changed midstream. Prompt case-by-case resolution of any actual interference complaints is the preferable solution to the issues underlying ARRL's objections, rather than adopting an overly exclusive new rule that could stunt the growth of new innovative technologies that hold great promise for broadband and smart grid applications.

## **Summary**

After careful review of the comments and studies in this proceeding, Arkados concludes that the Commission's original decision to retain the 40 dB/decade path loss extrapolation factor was the correct decision and remains valid today. As the Commission recognized in its earlier decisions, and all commenting parties agree (including the ARRL), real measurements in the real world vary substantially due to various environmental and technical factors, including frequency, the effects of near-by objects, and the architecture of the electric grid itself. The record is clear that the 40 dB/decade extrapolation factor is scientifically sound for application to the 2-30 MHz range and should be affirmed.

However, if against the evidence, the Commission should decide to modify the extrapolation factor, Arkados requests that application of any different extrapolation factor be

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<sup>5</sup> Comments of Current Technologies, LLC; Arkados Group, Inc.; Intellon Corporation; International Broadband Electric Communications, Inc.; SPiDCOM Technologies S.A.; and the United Power Line Council, all dated September 23, 2009.

accomplished through a separate provision in the rules and apply solely to Access BPL, as proposed in the Notice. While we believe that the record clearly supports retention of the 40/dB extrapolation factor for all industries and devices, the Court in its opinion and the Commission in the Notice for this proceeding, address only Access BPL. There is no record for applying a different extrapolation factor to the many other industries and devices subject to Section 15.31(f)(2) and that may exhibit different characteristics than Access BPL.<sup>6</sup>

## **ARRL**

The ARRL's Lone Comments Opposed to Retention of the Current Extrapolation Factor Fail to Present Convincing Scientific Technical Analyses Upon Which to Base a Change.

The ARRL again asserts that the Commission modify its Part 15 regulations for Access BPL, citing interference potential to amateur operations. They argue that the Commission should adopt a 20 dB/decade extrapolation factor for application in the 3 to 30 MHz band and require an additional 35 dB of notching for the amateur bands between 3 and 54 MHz. However, the ARRL does not provide any new field study to justify its request, and indeed, its comments repeatedly seem to suggest that the Commission should rely on only the studies and information that it had before the current Notice was issued. For example, discussing the extrapolation factor in its comments, ARRL states: "ARRL continues to maintain that, based on the information

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<sup>6</sup> Indeed, under the requirements of Section 553 of the Administrative Procedures Act, 5 U.S.C. § 553, no notice has been given that the rule changes under consideration in this proceeding could apply to any industry or devices other than to Access BPL.

before the Commission in 2004 and 2006, the proper conclusion to be drawn is that a 20 dB/decade extrapolation factor should have been adopted....”<sup>7</sup>

The task that the Commission has before it, however, is not to go back and reconsider its decision based on the stale record of 2004 or 2006. The Commission must consider all of the reports, studies and comments, including those responding to its 2009 Notice, such as this comment, and the studies that have been conducted since 2006 and only now are before the Commission. On that account, as the Commission set forth in its Notice and as Arkados and others describe in their comments, new studies and scientific work indicate that 40 dB/decade is reasonable as an extrapolation factor for these frequencies. The NTIA’s Phase II study, the Brazil study referenced in the Commission’s Notice, and a recent study submitted by the Communications Research Center to the IEEE all support a 40 dB/decade extrapolation factor and must be considered by the Commission in this proceeding. Indeed, had the Commission adopted the 20 dB/decade extrapolation factor favored by the ARRL, these later studies would justify the Commission changing the 20 dB/decade back to 40 dB/decade.

ARRL’s comments are based upon earlier data, published standards, computer simulations, and FCC staff engineers’ internal speculation and briefing options as they studied BPL and reasoned through their measurements for reports and presentations to their more seasoned engineer superiors. Given the ARRL’s criticism of relying on models rather than measured field data, it is noteworthy that during the three years since the Commission’s reconsideration decision on this matter, the ARRL does not submit a single new field study of its own. Yet it takes strong issue with the newer work on this subject by the NTIA and in Brazil.

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<sup>7</sup> See ARRL Comments at p. 52-53 (dated September 23, 2009).

The ARRL also argues that the IEEE P1775™/D1.9.7 Draft Standard for Powerline Communication Equipment – Electromagnetic Compatibility (EMC) Requirements – Testing and Measurements Methods should not be used as a reference for *in-situ* measurements because the standard has not been fully ratified. For the record, the IEEE P1775™/D1.9.7 Draft Standard currently is under review by a large and competent body of experts in the field who have studied and validated the *in-situ* measurement procedures. It has already met the minimum 75% affirmation required from industry, and is working to resolve comments received during the ballot process. Even as a draft, this standard represents the most recent collaborative work to accurately measure radiation specifically from power lines carrying BPL signals.

In Exhibit D to their Comments, “Industry Standards Addressing Distance Extrapolation,” the ARRL references multiple industry standards to cite various extrapolation factors which have been employed. These standards basically confirm that there are multiple views of what the extrapolation factor should be, and that it is generally greater than 20 dB/decade in the near field, and often 40 dB/decade or more, the lower end of the frequency range. It therefore is unclear why the ARRL cites these standards, presumably in support for utilizing a single extrapolation factor of 20 dB/decade for all frequencies below 30 MHz and all distances below 30 meters when, in fact, the standards demonstrate that there are different standards with multiple extrapolation factors -- a fact that supports the current rule.

### **Current Extrapolation Factor Should be Retained**

The current extrapolation factor is factually supported in the record and should be retained.

The record contains a full discussion of the Commission's own studies, studies and related materials from other sources, including comprehensive studies by the U.S. Department of Commerce's National Telecommunications and Information Administration ("NTIA") and new technical analyses conducted after the Commission made its original decision. These studies validate the scientific technical basis for using the 40 dB/decade extrapolation factor in the 2 - 30 MHz frequency range. The studies as a whole indicate that the extrapolation factor is greater in the lower range of this frequency range, less at the higher end, and overall, that 40 dB is scientifically sound.

All of the other commenters in this phase of the proceeding have substantial experience with BPL and support the current extrapolation factor. Several in-house BPL integrated circuit ("IC") vendors have been selling compliant ICs for the in-house market without incident for many years. For instance, Intellon Corporation has sold over 34 million HomePlug-compatible ICs in the United States and so far has not received any report of complaints regarding interference from radiated emissions.

Similarly, Current Technologies has deployed a number of functional access BPL systems and has an Access BPL system in Cincinnati, Ohio that covers over 50,000 homes that principally is used to offer broadband internet services. They report that in five years of operation, no interference incidents have occurred with this system.<sup>8</sup>

International Broadband Electric Communications, Inc. (IBEC) reports that it has deployed tens of thousands of BPL modems in rural areas to provide broadband service. Most significantly, customers of IBEC include users of the 3-30 MHz spectrum ("HF"), including

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<sup>8</sup> Comments of Current Technologies, LLC, dated September 23, 2009.

police and fire departments that heavily rely on their communications systems. IBEC reports that whenever it has had a report of interference, it has been able to resolve it relying on the existing FCC rules with the 40 dB/decade extrapolation factor.<sup>9</sup>

IBEC recently took measurements on quasi-peak and peak field strengths at a residential and rural location to measure the noise levels in the 2 to 30 MHz band and compared the results to the ITU noise curves. IBEC learned that at 10 MHz, the ambient noise level is 10 to 20 dB greater for the business and residential neighborhoods, respectively, than represented on the ITU noise curves. This is significant because the ARRL states that ambient noise levels are lower than the ITU curves for business and rural environments and that the Amateur Radios operate just above noise level.

SPiDCOM is engaged in the design and development of semiconductor circuits and modules that utilize medium and low voltage lines as a communication medium for "last-mile" broadband access communication and indoor local area networks. They argue for keeping the extrapolation factor at 40 dB/decade in order to maintain the high throughput and coverage levels required for this application.<sup>10</sup>

The United Power Line Council ("UPLC") states that the un-redacted internal studies released by the Commission generally are consistent with the rules and guidelines governing Access BPL and do not provide sufficient evidence for reducing the path loss coefficient to a value lower than 40 dB/decade.

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<sup>9</sup> Comments of Broadband Electric Communications, Inc., dated September 23, 2009.

<sup>10</sup> Comments of SPiDCOM Technologies S.A., dated September 23, 2009.

Intellon Corporation is a fabless semiconductor company engaged in the design, development, manufacturing, and marketing of integrated circuits (ICs) for power line communications or high-speed communications over existing electrical wiring both in the U.S. and abroad. Intellon has shipped over 34 million HomePlug-compatible ICs, many of which are deployed in the United States. Arkados is a publicly traded Power Line Communications (“PLC”) chip, communications software and application software manufacturer. Both our companies represent years of hands-on experience working with BPL, and comment that the Commission should reject ARRL’s arguments for a different extrapolation factor.

**Any Change to the Extrapolation Factor Should Apply Only to Access BPL**

To reiterate, both the Court in its decision, the Commission in the Notice, and ARRL in their opposition address only Access BPL. Nevertheless, because Section 15.31(a)(2) applies to many different devices in addition to those of Access BPL, Arkados requests that application of any different extrapolation factor be accomplished through a separate provision in the rules and apply solely to Access BPL, as proposed in the Notice.

The propagation characteristics of radiated emissions from Access BPL systems differ from those of in-house BPL systems. For example, access BPL systems typically contain apparatus for coupling the data communications signal into the power line at a height of approximately 12 meters above ground level. Typically, there is little shielding of the power line and negligible attenuation of the radio signal from nearby objects such as trees, vehicles, and homes. In-house BPL systems, on the other hand, typically have a power line coupler at or near ground level. Access BPL systems also arguably act as a line source radiator, whereas in-house BPL systems tend to be more contained within the electrical wiring of the home and attenuated

by the building's walls and the pole transformer serving the house. The electrical wiring of the house also is much closer to the ground level, and the house's dimensions fairly modest. These and other factors tend to result in significantly greater attenuation of signals for in-house BPL implementations as compared with Access BPL.

The differences between access-BPL and in-house BPL are significant. We therefore emphasize that if, against the evidence, the Commission decides to change the 40 dB/decade extrapolation factor for Access BPL, it should do so by creating a separate provision as it has proposed in the Notice. All the other devices covered by the current rule, including in-house BPL devices, have not been addressed in this rulemaking and have different characteristics that affect attenuation properties, and therefore should not be subject to any new extrapolation factor should one be adopted.

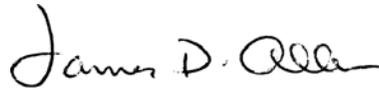
## **Conclusion**

After careful review of the comments and studies in this proceeding, Arkados concludes that the Commission's original decision to retain the 40 dB/decade path loss extrapolation factor was the correct decision and remains valid today. With the sole exception of the ARRL, all commenters request that the Path Loss Extrapolation Factor at frequencies below 30 MHz be retained at 40 dB/decade. Retaining the current rule without change is well justified by the technical record compiled in this 5-year-long proceeding, as discussed above.

If, against the evidence, the Commission should decide to modify the extrapolation factor for Access BPL, Arkados requests that application of any different extrapolation factor be accomplished through a separate provision in the rules and apply solely to Access BPL, as

proposed in the Notice. Devices and services other than Access BPL are not addressed in the Notice, nor the record, and should not be included in any changed rule.

Respectfully submitted,

A handwritten signature in black ink that reads "James D. Allen". The signature is written in a cursive style with a large initial "J" and a distinct "D" and "A".

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