

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Carrier Current Systems, including Broadband over Power Line Systems)	ET Docket No. 03-104
)	
Amendment of Part 15 regarding new requirements And measurement guidelines for Access Broadband over Power Line Systems)	ET Docket No. 04-37
)	

COMMENTS OF THE ACADEMY OF MODEL AERONAUTICS

To: The Commission

The Academy of Model Aeronautics (“AMA”) respectfully submits these comments in response to the *Notice of Proposed Rulemaking* (“NPRM”) released February 23, 2004, in the above-captioned proceeding which solicits comments on the appropriate regulatory structure for operation of Broadband over Power Lines (“BPL”).¹

Introduction

The AMA is a 170,000 member national association representing aeromodeling activities. AMA is the world’s largest sport aviation organization whose purpose is to promote the development of model aviation as a recognized sport and worthwhile recreation activity. The AMA is an associate member of the National Aeronautic Association, and is recognized by the world aviation governing body as the only organization that may direct U.S. participation in international aeromodeling activities. Approximately 10,000 of AMA’s 170,000 members are licensed amateur radio operators, the majority of whom fly their radio controlled (“RC”) aircraft on 50 MHz frequencies. Aeromodeling activities have significantly increased in the twenty-one years since the current RC modeling frequencies were assigned.

¹ 69 Fed. Reg. 12612 (Mar. 17, 2004).

Following a Notice of Inquiry which garnered over 5000 comments and revealed a wide split between those who support BPL as an untested but potential source of competition for cable modem and high speed internet services and those concerned about the potential for interference to other services, the Commission now proposes to allow widespread deployment of BPL under Part 15 of the Rules subject to certain additional regulatory requirements. The concerns expressed about BPL arise from its operation on channels utilized by other services, with deployment without licensing over wide areas of services transmitted in an unshielded manner via power lines. The concerns about the interference potential from BPL have been validated by the recent report of the National Telecommunications and Information Administration of the Department of Commerce, *Potential Interference From Broadband Over Power Line (BPL) Systems to Federal Government Radiocommunications at 1.7 – 80 MHz* (April 2004).²

The RC service operates pursuant to Subpart C of Part 95 of the Commission's regulations for management of model airplanes, cars, and boats.³ RC modeling currently uses six frequencies near 27 MHz, fifty frequencies in the 72 MHz band, and thirty frequencies in the 75 MHz band. In addition, five frequencies below 50 MHz and eighteen frequencies in the 50-54 MHz band are used for RC control under FCC rule parts 15 and 97, respectively. All of these bands lie within the contemplated operating range of BPL.

Comments

BPL is one of those technologies which has great theoretical potential but yet presents substantial questions about both its impact on other services as well as its marketplace viability. The cornerstone of BPL is the electric utility power distribution system, which is ubiquitous. However, the unknown level of demand for BPL service, the inherent constraints on capacity, its

² NTIA Report 04-413 ("NTIA Report"). See <http://www.ntia.doc.gov/ntiahome/fccfilings/2004/bpl/index.html>.

³ RC operators are licensed by rule pursuant to 47 C.F.R. § 95.204.

susceptibility to both cause interference to and receive interference from other RF devices, and the market effect of the non-interference conditions imposed by the Commission's rules all raise questions about its practical implementation. It is the potential for harmful interference that causes AMA and its members concern about widespread deployment of BPL. This concern is reinforced by the NTIA Report

Approximately 5,000 permanent RC flying sites are located throughout the United States. In addition, with the growing popularity of small, electric-powered RC model aircraft (often referred to as "park flyers") which require only a small open field—or in some cases only a large auditorium or gymnasium, the number of transient sites are countless. In general, outdoor RC modeling flying sites are located away from buildings; but many occupy areas adjacent to power lines. For example, the AMA's 1,000-acre national flying site, headquarters, and museum in Muncie, Indiana are all located near power lines. For RC operators, there is no way to anticipate interference, since there is no two-way communications function associated with RC control of the type that could give a warning of a BPL interfering signal. Moreover, RC operators being individuals who enjoy model flying as a hobby generally are not technically proficient in telecommunications engineering in a manner such that they may be expected to monitor for BPL signals.⁴ Accordingly, interference from BPL transmissions could create a safety hazard, to both property and life, where a 50+ pound model flying at a speed in excess of 100 miles per hour suffers loss of its control channel and heads into an object and possibly into onlookers. The Commission proposes to allow BPL to operate under its existing Part 15 technical standards (emission limitations), subject to the following additional regulatory requirements:

- 1) Adoption of adaptive interference mitigation techniques,
- 2) Maintenance of a database of location information and technical information, and

⁴ The RC user community thus may be contrasted with the amateur radio operators who engage in voice communications and who generally are interested in radio engineering matters.

- 3) Adoption of measurement guidelines and reaffirmation of use of the Verification equipment authorization procedure.

AMA's comments on the proposals advanced by the Commission follow.

Application of Part 15 Emission Limitations

AMA is appreciative of the Commission's affirmation that BPL must be subject to the Part 15 non-interference conditions.⁵ The issues presented are (i) what this means, and (ii) how this is enforced. The fact that the Commission recognizes the need for additional regulatory standards constitutes tacit acknowledgment that the Part 15 emission limitations (Sections 15.109 and 15.209) are not adequate to protect against interference. These standards were adopted to address point-source radiators, not radiators over distributive systems. The NTIA Report notes that "BPL signals unintentionally radiate from power lines . . ." ⁶ Given the nascent stage of BPL development, it would be well for the Commission to require a much more extensive database of testing experience before fully sanctioning widespread BPL deployment, as well as more stringent equipment authorization procedures as discussed *infra*.

In addition, AMA requests the Commission to confirm the application of the non-interference standard of Part 15 to all authorized radio spectrum users. Concerns about the harmful effects of BPL were expressed to the Commission by operators both of systems which

⁵ NPRM at ¶ 39: "Notwithstanding compliance with the Part 15 emission limits, we wish to emphasize that Access BPL would also operate under our Part 15 non-interference conditions. Thus, operations must cease if harmful interference to licensed services is caused." See 47 C.F.R. § 15.5: "General conditions of operation.

(a) Persons operating intentional or unintentional radiators shall not be deemed to have any vested or recognizable right to continued use of any given frequency by virtue of prior registration or certification of equipment, or, for power line carrier systems, on the basis of prior notification of use pursuant to Sec. 90.63(g) of this chapter.

(b) Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.

(c) The operator of a radio frequency device shall be required to cease operating the device upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected.

(d) Intentional radiators that produce Class B emissions (damped wave) are prohibited."

⁶ NTIA Report at 3-12.

are individually licenses and also of systems licensed by rule.⁷ AMA respectfully requests the Commission to confirm that the non-interference requirement applies for the benefit of those licensed by rule as well as those who are individually licensed.

Adaptive Interference Mitigation Techniques

The Commission's proposed requirement for adaptive interference mitigation techniques also evidences the judgment that the Part 15 emission limitations are not adequate to protect other users. The Commission recognizes that the potential wide-spread and wide-area deployment of BPL distinguishes BPL from other operations subject by the Commission's rules to a non-interference condition; and consequently, the Commission proposes to specify means of compliance with the non-interference condition. These include incorporation of devices to modify system performance, including (i) reduction of power on a dynamic or remote basis, (ii) change of operating frequencies, (iii) exclusion of specific operating frequencies ("notching"), and (iv) termination of operations.⁸

The foregoing look good on paper. The test is in their application. The non-interference condition is absolute, and particularly so in that Part 15 devices have the lowest status under the FCC's rules.⁹ The Commission must make absolutely clear to BPL operators that it is their duty to undertake the mitigation measures immediately upon request of another RF spectrum user. As a permitted user on a non-interference basis, the BPL operator must be required (i) to have a telephone contact available "24/7," 365 days per year, and (ii) to modify or terminate operations immediately upon receipt of an interference complaint. In contrast to Section 15.5 (c) of the Commission's rules, the obligation to implement and pursue the proposed mitigation techniques

⁷ See NPRM at ¶ 19 regarding concerns of Telecommunications for the Deaf, Inc., pertaining to interference to hearing aids and other systems used by the hearing impaired. See also Reply Comments of AMA in response to the Notice of Inquiry in ET Docket No. 03-104 (Aug. 18, 2003).

⁸ NPRM at ¶¶ 40-42.

⁹ *Supra* at n. 5.

should run from a complaint or request of a user, and not await notification by a Commission representative. One sure way to determine if the BPL is causing interference is to remove the offending signal immediately and see if the interference ceases. Application of the non-interference condition must not be allowed as a matter of first instance to be turned into an adjudicatory proceeding. The burden of compliance must be on the BPL operator. Moreover, for users such as aeromodeling operators, who do not have the capability to determine whether a BPL signal exists prior to conducting operations, BPL operators, upon receipt of notice of radio controlled operations to be conducted in the vicinity of a BPL system, should be required to implement the proposed adaptive mitigation techniques and change or notch frequencies, or temporarily cease operations, to accommodate the user entitled to protection.

Consistent with the non-interference status, the Commission should require BPL operators to inform customers of services to be delivered via BPL of the non-interference status and of the potential for disruption of operations pending resolution of interference complaints. This is fully consistent with existing Commission policies. Normally, those operating on a non-interference basis cannot provide commercial services without specific Commission authorization. *See* 47 C.F.R. §§ 21.404 (c) and (d) (Domestic Public Fixed Services), 22.403 (c) and 22.409 (d) (Public Mobile Services), and 101.409 (c) and (d) (Fixed Microwave Services). Where commercial operation is allowed, notice of the conditioned nature of the service is required to be given to users. *See* 47 C.F.R. §§ 5.85 (c) and 5.93 (b) (Experimental Radio Service, limited market studies). *Accord*, 47 C.F.R. § 2.803 (c) (exhibition of non-authorized radio equipment permitted with specified notice).¹⁰ These notifications should be clear and conspicuous in the promotional materials and service agreements, and further should be required

¹⁰ AMA recognizes that there are exceptions in that some commercial services operate under the Part 15 rules. These, however, such as “Wi-Fi”, generally are point-source radiators and operate much higher in the radio spectrum, in bands much less invested with existing users.

to be specifically acknowledged—in writing-- by the customers. So requiring will serve to obviate any BPL operator arguments that third parties are relying on its service and it therefore cannot modify or terminate operations.

Maintenance of Database

Considering the lack of individual licensing of BPL, and the wide range of available frequencies for operation, it is both necessary and appropriate that the Commission require BPL operators to maintain a database of locations, direction of the transmissions, frequencies, and other technical information.¹¹ BPL operators must be required to post their information on the database prior to commencement of operations. This information must be made available to all interested parties via a database accessible over the internet and without fee or other requirement. Such a database will allow AMA members to check for BPL operations before engaging in model aircraft flying activities at a particular location. As discussed above, short of a tragic incident where control over a model is lost and the model causes injury or damage to other property or itself, this likely will be the only method for BPL operators and others to identify BPL sites and adjust their activities (or request the BPL operator to change its frequency).

To the extent the power utility industry may be concerned about identifying power lines in such a public manner over the internet, AMA notes that power lines and other utility facilities are readily visible to the naked eye, and further that information concerning power line locations may be readily found on the internet. *See* http://www.enermap.com/electric_map.html. In any event, it is not information on the power line systems that would be accessible, but rather the BPL communications devices. This is no different from having electric utility, energy company and public safety communications licensing information being available today from the Commission via the internet and the FCC's ULS licensing database.

¹¹ NPRM at ¶ 43.

Measurement Guidelines and Equipment Authorization Procedures

AMA understands there are issues concerning the measurement guidelines as applied to BPL systems.¹² The NTIA Report confirms that the measurement guidelines well may require revision, stating that “Current Part 15 measurement techniques may significantly underestimate the peak field strength generated by BPL systems . . .”¹³ The Report further states that, according to NTIA’s measurements, “the radiated power from the BPL energized power lines was consistently higher when the measurement antenna was placed at a greater height (*e.g.* 10 meter vs. 2 meter),”¹⁴ which is a significant issue to AMA considering that model aircraft operate above the power lines.

AMA is further concerned that the rules assure that Part 15 BPL equipment operate within the emission limits set by the Commission. AMA notes that the Commission has received a number of complaints concerning power line carrier (“PLC”) operations, of which BPL is a form, causing interference to licensed operators. The American Radio Relay League has documented some of these complaints on its website. *See* http://www.arrl.org/tis/info/HTML/plc/FCC_enforcement/FCC_Enforcement_Letters.html.

These interference concerns are readily understandable based upon the information publicized by one PLC equipment manufacturer, ITRAN Communications Ltd.:

The power line is an extremely difficult and noisy communications medium characterized by several unpredictable and strong forms of interference, making it an extraordinarily perilous environment for non-robust communications. Every appliance that is connected to an outlet contributes line interference, which can be approximated as Additive White Gaussian Noise (AWGN). Dimmer switches, motorized electrical appliances and computers introduce pulse interference. Fast fading also corrupts power line communication channels, which have non-flat frequency responses and suffer from unpredictable jamming as well as carrier wave signal interference. All the forgoing make it exceedingly difficult to ensure reliable power line communication and help explain the

¹² NPRM at ¶¶ 45-47.

¹³ NTIA Report at 3-12

¹⁴ *Id.* at 5-16.

difficulties alternative technologies have had in delivering reliable power line communication.¹⁵

The Commission proposes to require BPL equipment to be authorized in accordance with the Commission's Verification procedure.¹⁶ Considering the need to overcome "an extremely difficult and noisy communications environment," the history of power line carrier interference, the potential for widespread application of BPL, and the substantial risk to licensed services, AMA respectfully submits that a more stringent equipment authorization procedure be applied. Specifically, AMA submits that BPL equipment be authorized under the Commission's Certification procedure.¹⁷ This procedure requires the applicant to submit its test results to the Commission, which then can evaluate the modulation characteristics, occupied bandwidth, measurement of spurious emissions, frequency stability and harmonics.¹⁸ It is incumbent on the Commission to assure, to the maximum extent possible, that BPL equipment operates fully within its emission limitations. The optimum means of so assuring is through applying the Commission's Certification equipment authorization process.

Conclusion

AMA recognizes the Commission's interest in facilitating new technologies and competition in telecommunications services. Whether BPL develops commercially in the fashion of PCS, or whether BPL turns into another over-hyped concept with no viable market such as the Interactive Video and Data Service¹⁹ is yet to be seen. In structuring an environment for BPL to develop, however, the Commission must be mindful that there are numerous existing

¹⁵ See <http://www.itrancomm.com/tech.htm>.

¹⁶ NPRM at ¶ 44.

¹⁷ See 47 C.F.R. § 2.907.

¹⁸ *Id.* at §§ 2.1047-2.1057.

¹⁹ *Amendment of Parts 0, 1 and 95 of the Commission's Rules to Provide Interactive Video and Data Services*, Gen. Doc. 91-2, 7 FCC Rcd 1630 (1992); but see *Amendment of Part 95 of the Commission's Rules to Provide Regulatory Flexibility in the 218-219 MHz Service*, WT Doc. No. 98-169, 64 Fed. Reg. 59656 (Nov. 3, 1999).

services and users, having substantial investments in their telecommunications equipment and related systems, operating on the very frequencies that BPL operators may employ. It is incumbent on the Commission to protect those existing users and systems. The Commission is all too aware of the “Law of Unintended Consequences”,²⁰ and it therefore is essential for the Commission to ensure that BPL deployment is permitted under a regime which protects existing users and uses of the radio frequency spectrum. The measures discussed above will contribute to that end result.

WHEREFORE, THE PREMISES CONSIDERED, the Academy of Model Aeronautics urges the Federal Communications Commission to impose the conditions and terms described above in reaching any final decision to authorize widespread deployment of broadband over power line technology under Part 15 of the Commission’s rules.

Respectfully Submitted,

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²⁰ See e.g., the Commission’s 800 MHz spectrum realignment proceeding, *Improving Public Safety Communications in the 800 MHz Band; Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels*, Docket WT 02-55, 17 FCC Rcd 4873 (2002).