

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

FILED/ACCEPTED

To: The Commission

DEC 20 2011

Federal Communications Commission
Office of the Secretary

PETITION FOR RECONSIDERATION OF SECOND REPORT AND ORDER

ARRL, THE NATIONAL ASSOCIATION FOR AMATEUR RADIO
225 Main Street
Newington, CT 06111-1494

Christopher D. Imlay
General Counsel
BOOTH, FRERET, IMLAY & TEPPER, P.C.
14356 Cape May Road
Silver Spring, MD 20904-6011
(301) 384-5525

December 20, 2011

No. of Copies rec'd 0+1
List ABCDE

TABLE OF CONTENTS

Summary

Petition for Reconsideration	1
I. Introduction.	2
II. The Interference Potential of Access BPL is Substantial; the Current Rules are Ineffective in Preventing Interference <i>Ex Ante</i> ; and Enforcement Remedies are Unavailable and Inadequate as a Substitute for Reasonable Preventative Rules for BPL Interference.	6
III. Information on Which the Commission Admittedly Relied in Adopting its Insufficient and Ineffective BPL Rules Shows that Access BPL has a Very Substantial Interference Potential, Requiring Full-Time Notching of Amateur Bands.	13
IV. Any Variability in the Median Noise Level, and Any Variability of the Decay of RF Fields Near Power Lines Militates in Favor of Requiring Full Time Notching of Amateur Bands By BPL Facilities, and Vitiates the Commission's Measurement Procedures.	22
V. The Distance Extrapolation Factor.	23
VI. Conclusions.	25

Exhibit A

Exhibit B

SUMMARY

ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL), requests that the Commission reconsider and modify the *Second Report and Order* (the R&O), FCC 11-160, released October 24, 2011, 76 Fed. Reg. 71892 *et seq.* The R&O made minimal changes to Part 15 of the Commission's rules governing unlicensed Broadband over Power Line (BPL) technology but otherwise reaffirmed those rules following remand of the matter from the United States Court of Appeals for the District of Columbia Circuit. The Commission continues to assert incorrectly that Access BPL operating in accordance with its reaffirmed rules has only a "small" risk of harmful interference that can be managed and corrected as needed on a case-by-case basis. This holding is inconsistent with extensive technical submissions in a fully developed technical record.

While BPL has failed in the marketplace as a medium for delivering broadband connectivity to consumers, the technology is still touted as a mechanism for "smart grid" applications. The Commission should acknowledge: (1) the unique and substantial interference potential of Access BPL systems relative to Amateur Radio HF communications; (2) the inapplicability and/or inadequacy of the current BPL rules to Access BPL/Amateur Radio interaction; (3) the clear necessity of mandatory, full time notching by Access BPL companies of Amateur Radio allocations to notch depths of *at least* 25 dB; and (4) the absence of any negative effect on BPL systems of the obligation to maintain full-time notching of Amateur bands. Mandatory full-time Amateur band notching to 25 dB should be implemented in the Part 15 rules.

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

In the Matter of)	
)	
CARRIER CURRENT SYSTEMS)	ET Docket No. 03-104
INCLUDING BROADBAND OVER)	
POWER LINE SYSTEMS)	
)	
AMENDMENT OF PART 15 REGARDING)	ET Docket No. 04-37
NEW REQUIREMENTS AND)	
MEASUREMENT GUIDELINES FOR)	
ACCESS BROADBAND OVER POWER LINE)	
SYSTEMS)	

To: The Commission

PETITION FOR RECONSIDERATION OF SECOND REPORT AND ORDER

“The public must be able to trust the science and scientific process informing public policy decisions. Political officials should not suppress or alter scientific or technological findings and conclusions. If scientific and technological information is developed and used by the Federal Government, it should ordinarily be made available to the public. To the extent permitted by law, there should be transparency in the preparation, identification and use of scientific and technological information in policymaking.” President Obama, March 9, 2009; Memorandum for the Heads of Executive Departments and Agencies.

ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL), by counsel and pursuant to Section 1.429 of the Commission’s rules (47 C.F.R. §1.429), hereby requests that the Commission reconsider and modify the *Second Report and Order* (the R&O), FCC 11-160, released October 24, 2011, 76 Fed. Reg.71892 *et seq.* The R&O, pursuant to comments filed in response to the *Further Notice of Proposed Rule Making*¹ in this proceeding, made minimal changes to Part 15 of the Commission’s rules governing unlicensed Broadband over Power Line (BPL) technology but otherwise reaffirmed those rules following remand of the matter from the United States Court of Appeals for the District

¹ *Request for Further Comment and Further Notice of Proposed Rulemaking (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)*, 24 FCC Rcd 9669 (2009) (*Further Notice*).

of Columbia Circuit.² In reaffirming yet again its flawed rules governing Access BPL and by continuing to assert that Access BPL operating in accordance with those reaffirmed rules has only a “small” risk of harmful interference that can be managed and corrected as needed on a case-by-case basis³ the Commission has strained to discount extensive technical submissions that contradict its predetermined view. The R&O exhibits a highly disturbing, yet consistent and repeated pattern of obfuscation and denial that is directly counter to the current Administration’s promises to the public in 2009, cited above. The R&O is wrong in virtually all of its main premises and conclusions, and the 700,000 public service-minded licensees of the Commission in the Amateur Radio Service deserve more honesty and candor from this Agency. Now, on reconsideration, the Commission has one more chance to (1) address and manage, *ex ante*, the significant interference potential that Access BPL has in the High Frequency (HF) bands; and (2) to at least minimally protect the Amateur Radio Service in advance from the severe interference which will occur, and which has occurred in residential areas, absent adoption of modified rules for BPL. If the Commission does nothing else in this proceeding on reconsideration, it must modify the rules to require *full-time notching* of Amateur Radio allocations by Access BPL systems operating in the bands 3 to 30 MHz to a notch depth of at least the 25 dB that the R&O ordered that such systems be universally *capable* of implementing, because otherwise, Amateur Radio stations will have no remedy for the interference that will occur. As good cause for its Petition, ARRL states as follows:

I. Introduction

1. In this latest R&O, the Commission: (1) increased the notch depth that BPL modems must be capable of implementing in Amateur Radio allocations below 30 MHz from 20 dB to 25 dB, within eighteen months from the effective date of the R&O; (2) refused to require that this notching

² *American Radio Relay League, Inc. v. FCC*, 524 F.3d 227 (D.C. Cir. 2008).

³ R&O, at ¶ 14.

be implemented on a full-time basis in Amateur Radio Service allocations; (3) retained the 40 dB per decade of distance extrapolation factor for measuring BPL radiated emission signal decay; (4) specified a site-specific test method for making such measurements; and (5) reaffirmed its conclusion that the rules adopted in the first Report and Order⁴ in this proceeding are adequate to protect licensed Amateur Radio stations from interference from unlicensed BPL radiated emissions.⁵ By these holdings, the Commission has, once again, failed in its fundamental obligation to enact, and responsibly administer regulations that protect an important, international public resource; all in an effort to promote a failed, spectrum-polluting, carrier-current technology.

2. Access BPL has proven since the rules were adopted in 2004 to be a failed technology for broadband delivery, despite being touted by the Commission at various times since 2003 as the universal “third pipeline to the home” and the key to rural broadband delivery.⁶ It never was either of those things. The Commission’s December 31, 2010 report on the status of internet access services showed no more than 6,000 customers nationwide receiving service via “power line and other” connections. Yet, at Paragraph 14 of the R&O, the Commission continues to hold, untenably, that it has in this proceeding “established a regime of rules for Access BPL systems that will provide a robust environment for the development and deployment of this important (sic) new (sic)

⁴ Report and Order, FCC 04-245 (“Access BPL Order”), *Amendment of Part 15 Regarding New Requirements and Measurement Guidelines for Access Broadband of Power Line Systems*, 19 FCC Rcd. 21,265 (October 28, 2004).

⁵ It has repeatedly been noted by ARRL that the Commission’s rules governing BPL have no practical application to the interaction between BPL systems and Amateur Radio stations located in residential areas. *None* of what the Commission refers to as “additional limitations” on BPL systems relates to Amateur interference from BPL: The notching capability and frequency agility requirements are not required to be implemented -- only the capability is required. Consultation with licensed users is not required in the case of Amateur Radio; it only applies to public safety systems. Exclusion zones and excluded frequencies do not include any Amateur bands at any location. Access BPL location identification in the public database is, as discussed below, not possible, because the database has *never* been accurate and it is not accurate now.

⁶ With many tens of millions of broadband lines available in the United States, BPL has never enjoyed more than 0.011% of market penetration. At each release by the Commission of an updated Broadband Report, that percentage has been smaller. BPL is not even mentioned substantively in the National Broadband Plan: the only reference is in passing at page 337, noting that BPL was classified as an information service. Yet the R&O, at paragraph 43, states *without quantification* that BPL devices bring “expanded benefits to electric utility companies by allowing them to monitor, and thereby more effectively manage their electric power distribution operations” and “last-mile” delivery of broadband services to some rural and underserved areas.”

technology.” The Commission goes on to observe that, while “there is some potential for increased harmful interference from BPL operations, particularly in locations within a short distance of the power lines used by this technology...” the rules attempt to “minimize instances of interference” while allowing BPL systems to operate “in a viable manner to serve the needs of the American public.” The Commission continues “to hold that, on balance, the benefits of Access BPL for bringing broadband services to the public are sufficiently important and significant as to outweigh the limited increase in potential for harmful interference that may arise.”⁷ The Commission says that it agrees with NTIA that “the potential benefits of Access BPL service warrant acceptance of a negligible (sic) risk of harmful interference that can be managed and corrected on a case-by-case basis.”⁸ Access BPL is not an “important new technology” and never has been; it is old, carrier-current technology that has failed in the marketplace (absent government subsidy) as a broadband delivery mechanism.⁹ The rules that the Commission has established for BPL are insufficient to prevent interference to large numbers of Amateur Radio stations in residential areas, should Access BPL be used in the future for smart grid control. There was never any “balancing” of the interference potential of BPL; there was simply the denial of that interference potential in order that the Commission could continue to represent to Congress and the current administration that it was and is doing everything it can to promote broadband rollout. BPL, using as it does unshielded overhead power lines to carry High Frequency (HF) radio signals, for which those lines were never intended, ubiquitously throughout entire municipalities and for miles along public roadways, obviously merits

⁷ R&O, at ¶ 14.

⁸ NTIA’s statement to this effect was made in 2004, well before it became clear that BPL failed in the marketplace and that its residual potential future application – if any -- is limited to smart grid control.

⁹ The failure of the Manassas, Virginia BPL system is the bellwether illustration of this market failure and of the inadequacy of BPL as a broadband delivery mechanism. When Manassas finally pulled the plug on the municipal system, it was suffering a \$165,000 annual deficit – more than \$300 per customer. Other BPL systems around the country have been quietly shelved or abandoned. Nearly all retail marketing of BPL services has ceased. The singular exception is IBEC, which has continued to promote its system to rural electric cooperatives that qualify for Federal subsidy.

regulatory treatment different from normal Part 15 regulations.¹⁰ The Commission does not impose conducted emission limits on BPL; it atypically imposes radiated emission levels instead.¹¹ This being the case, ARRL has shown in the record that full-time, Amateur band notching, to a reasonable notch depth¹² is standard in the industry now, both with respect to in-premises BPL and Access BPL, though it is not universal in the latter. Obviously, the Commission's rules can and should reflect this standard, because it does not substantially affect BPL systems. It would, however, reduce the interference potential to a level that can be addressed by BPL device operators, electric utilities and radio amateurs on a case-by-case basis. That is not true with the rules as they currently exist. Full-time mandatory Amateur band notching to a reasonable notch depth is needed because the Commission is both unwilling and incapable of addressing BPL interference on a case-by-case basis.^{13 14}

¹⁰ The conducted level of BPL in a number of industry standards is -56 dBm/Hz. In a 50-ohm system, this is a level that is approximately 30 dB higher than the conducted emissions limits for most non-carrier-current Part 15 devices. ***One BPL modem makes as much conducted noise as 1000 other Part 15 devices.*** Assuming that the conducted emissions limit for other devices is appropriate, an increase of 1000 times that noise level is a significant interference potential.

¹¹ At paragraph 25 of the R&O, the Commission states that ARRL's request for 35 dB of mandatory, full time Amateur band notching by Access BPL systems constitutes a request to limit BPL systems to 1/5000th of the levels permitted other unlicensed unintentional emitters. However, most unlicensed unintentional emitters do not meet radiated emission levels. Instead, they are required to meet conducted emission levels. If BPL signals were required to be attenuated to the Class B conducted emission limits applicable to most unintentional emitters consistent with the Part 15 rules, the rules would be sufficient to predictably limit interference potential.

¹² Whether that notch depth is 25, 30 or 35 dB is not as important as mandating full time mandatory notching.

¹³ The Commission has not once successfully resolved documented BPL interference complaints. It failed to take any action to resolve interference complaints from multiple sources in Raleigh, North Carolina; Manassas, Virginia; Emmaus, Pennsylvania; Cedar Rapids, Iowa; Briarcliff Manor, New York; Cottonwood, Arizona; Lee's Summit, Missouri; and most recently, Arrington, Virginia, Fairfield, Virginia, Somerset, Pennsylvania and Martinsville, Indiana. Years have passed between the time of the interference complaints to the Commission and the resolution of the interference, and in each case, that resolution occurred only by virtue of the fact that the BPL system was finally shut down. One of the worst examples was Manassas, Virginia; a BPL system that the Commission hailed as a great success and a validation of the technology.

¹⁴ At paragraph 32 of the R&O, the Commission claims to have contacted the experimental "licensee" of the now-defunct Briarcliff Manor about interference "several times" over the course of its operation and the operator "took steps first to cease operation on the amateur frequencies and then to install new equipment that had notching capability. Subsequent examination of that system by field agents of our Enforcement Bureau found no interference, which substantiates the effectiveness of our rules when properly observed." This is a gross mischaracterization of what occurred. The interference from this system was never mitigated or reduced by the holder of the experimental authorization. The Commission terminated the enforcement proceeding without any action at all. The interference continued unabated until the system was shut down. The Commission's enforcement personnel did not find

II. The Interference Potential of Access BPL is Substantial; the Current Rules are Ineffective in Preventing Interference *Ex Ante*; and Enforcement Remedies are Unavailable and Inadequate as a Substitute for Reasonable Preventative Rules for BPL Interference.

3. The Commission concludes at paragraph 14 of the R&O that there is “some” potential for interference to licensed radio services within “short” distances from power lines radiating BPL emissions. This is a misstatement. Even at 30 meters’ distance from the power lines, assuming that BPL systems set their emissions at the limit specified in the Commission’s Rules,¹⁵ BPL systems are allowed to operate full time across multiple, entire Amateur Radio bands. The limits for BPL are set at levels that are as much as 25 dB greater than the generally accepted median levels of ambient noise in typical residential environments and over 45 dB greater than the quiet rural environment that represents the more quiet times and frequencies within an Amateur band.¹⁶ Nowhere does the R&O address this. It merely discusses whether or not ambient noise levels are increasing or decreasing.¹⁷ Neither does the R&O address many of the sources cited in ARRL submissions following the Court’s remand that show that there is a substantial interference potential from Access BPL to Amateur Radio stations. For example, in Exhibit A to ARRL’s November 30, 2010 *ex parte* submission, ARRL cited a June 20, 2010 report commissioned by the United Kingdom Office of Communications (Ofcom) entitled *The*

interference during their one visit over a two year period because, *as ARRL staff told them at the time*, they did not go to the locations where the interference was reported. Two years of constant interference resulting in Congressional inquiries is not evidence that the Commission’s rules are effective. Instead, the clear inference is that *post hoc* enforcement is unavailable as a remedy for BPL interference.

¹⁵ As ARRL has reported to the Commission repeatedly [most recently on December 30, 2010 with respect to the IBEC (International Broadband Electric Communications, Inc.) BPL systems in southwestern Virginia and one in Pennsylvania], BPL systems, in order to function, must and do operate at levels far higher than those permitted by the Commission’s rules.

¹⁶ To add perspective relative to the median noise levels, a single BPL device makes 317 times more noise than what is found in median noise levels in Amateur HF allocations.

¹⁷ ARRL submitted studies showing that ambient noise levels are decreasing merely to offset the claim by some BPL companies that noise levels are increasing. The levels of man-made noise shown in ITU-R P.372 and the protection criteria of SM 2158 are a reasonable and valid basis from which to protect the Amateur Radio Service from widespread harmful interference.

*Likelihood and Extent of Radio Frequency Interference from In-Home PLT Devices.*¹⁸ This study concluded, in relevant part, that : (1) if demand increases, there will be ***a high probability of interference*** to some existing spectrum users at both HF and VHF by 2020 if PLT device features do not change from those currently implemented; (2) Over the next 5 to 10 years, ***users of sensitive radio systems may increasingly suffer interference from PLT devices***; unless (3) within this timescale, ***in addition to the existing practice of notching International Amateur Radio Union (IARU) bands***, interference mitigation features such as power control and smart notching are implemented in PLT devices. At no point did the Commission address this study or other sources that ARRL cited, showing that BPL has substantial interference potential.

4. The NTIA Phase 1 BPL study¹⁹ made it clear that the interfering signal ranges of BPL signals, even if operated at normal Part 15 levels, are excessive. ARRL experience with many field measurements in BPL interference cases that BPL harmful interference has been noted at Amateur stations with antennas located at distances of ½ mile from the power line. An interference distance of 400 meters from a power line is not a “short distance.” As ARRL has noted numerous times in this proceeding based on NTIA findings, the interference potential from Access BPL in residential areas is essentially 100 percent – and nearly all Amateur Radio stations are located in residential areas. The Commission’s Technical Research Branch concluded, using ARRL surveys that 53 percent of

¹⁸ PLT is “power line telecommunications” (BPL). The report is available in its entirety at <http://www.emcia.org/documents/pltreport.pdf>.

¹⁹ The NTIA study concluded that, at current Part 15 levels, the interference contour of Access BPL systems to land vehicle, boat, and fixed stations receiving low to moderate desired radio signals in the frequency range 1.7-80 MHz is likely in areas extending to 75 meters, 100 meters and 460 meters from the power lines respectively. Further, interference to aircraft reception of moderate to strong desired radio signals is likely to occur at heights up to 6 km altitude within 12 km of the center of the BPL deployment. A reading of these conclusions would lead any reasonable person to conclude that these interference contours are far larger than what the Commission has alluded to. See, *Potential Interference from Broadband over Power Line (BPL) Systems to Federal Government Radiocommunications at 1.7-80 MHz*, NTIA Technical Report 04-413 (Phase 1 Study) released April 27, 2004.

Amateur Radio operators who responded to an ARRL survey²⁰ reported that their antennas were located within 30 meters of an overhead medium-voltage power line, and 31% reported that their antennas were within 15 meters of an overhead power line. There is no intervening attenuation of the BPL signal before it reaches the outdoor, high-gain Amateur Radio antenna, typically in the same or a higher horizontal plane as the power line.

5. In the Access BPL Order in 2004, the Commission stated at paragraph 39: “Moreover, the NTIA Phase I study and our own field measurements of Access BPL installations indicate that these systems are not efficient radiators, nor are their emissions cumulative such that they permeate areas in which they are located.”²¹ BPL interference most certainly does permeate areas in which the devices are located because the overhead, unshielded power lines exist throughout residential areas, not just along one line of one roadway.²²

6. Hedging on the interference potential of BPL, the Commission in 2004 adopted only cosmetic, after-the-fact interference mitigation provisions which were either ineffective or inapplicable to Amateur Radio interference, or both.²³ The Part 15 rules were developed, however, upon the fundamental premise that interference will be avoided *ab initio*. The Commission has now reaffirmed the adequacy of its ineffective, post hoc interference remedial scheme, stating at Paragraph 55 of the R&O that:

We are, and were, aware that amateur receive sites are typically located outdoors in relatively close proximity to power lines and that BPL emissions are likely to be present over all or large portions of the amateur bands. These considerations, as well as similar considerations with respect to other services, led us to require that Access

²⁰ <http://www.arrl.org/survey.php3?pollnr=195>. The study was included in its entirety as Exhibit G to the November, 2010 ARRL *ex parte* filing.

²¹ This is both incorrect and irrelevant; the efficiency of the radiator is moot because interference is regulated by radiated emission limits which are not relative to the efficiency of the radiator. No matter how fervently the Commission would have it otherwise, BPL noise decays very slowly along an overhead power line.

²² In areas where access BPL is deployed, virtually every roadway will have BPL systems operating on one or more Amateur bands, regardless of whether BPL repeaters change frequency along the next stretch of roadway.

²³ See Footnote 5, *supra*.

BPL operators be capable of remotely managing their facilities to reduce or eliminate emissions in locations where interference might occur and to require establishment of a database of BPL operations so that licensed radio users could contact the local BPL operator if interference were to occur.

Contrary to the Commission's assumptions, the BPL operator has no incentive to utilize the notching capability unless it is required by the Commission to do so. Experience, including recent experience, shows that they simply don't do it when confronted with an interference complaint. Conversely, when the systems are notched on Amateur allocations, there is typically not a compatibility problem. The Commission, for its part, has made clear by its inaction in interference cases that go on for *years* that it has no intention to conduct any enforcement where there are interference complaints related to BPL.²⁴ And reliance on the BPL database called for by Section 15.615(a) of the rules for anything at all is impossible. As ARRL stated in its comments on the Further Notice at page 59:

The Access BPL database, on which the Commission placed so much reliance as an interference mitigation tool in the Access BPL Order and the Order on Reconsideration, is now and has been virtually useless due to omissions and a lack of updated information...The database is rife with errors, omissions, and listings of BPL systems that are not operating any longer. The database contains entries for systems that have never been placed in operation, and apparently never will be. In other cases...e-mail sent to the contact point in the database comes back as failed mail.

The basic premise for the database -- to permit those licensees receiving harmful interference from BPL systems to be able to contact the system operator and work out some remedy for the interference -- is frustrated. ARRL, in Exhibit D to its written *ex parte* filing in this proceeding dated November 30, 2010, showed that, of 170 zip codes in the United States then shown in the database to have a BPL system operating in them, there were 40 errors that made the entries impossible to utilize. At that time, there were misrepresentations in the database. IBEC for example reported that its systems in all zip codes implemented Amateur band notching, which

²⁴ This is true as well with general power line interference cases. Dozens of these cases, in which power line noise completely precludes Amateur Radio communications, have persisted without Commission resolution for up to 12 years in some cases. Unresolved power line interference cases three or four years old are the norm.

recent measurements then (and now) have proven to be not true. The Commission cannot tout the database as an interference mitigation tool, knowing as it does that the database is unreliable and inaccurate.²⁵ **Exhibit A** hereto discusses the condition of the database at this time.

7. The R&O, at paragraph 101, claims to have addressed the flaws in the database because Commission staff has contacted UTC, one of the managers of the database, and asked that it be cleaned up.²⁶ But the flaws in the database persist nevertheless, and the Commission's reliance on the BPL database puts the lie to its own conclusions. The Commission cites the BPL database, for example, at footnote 144 of the R&O, which discusses the fact that there is but one pending BPL complaint now (concerning an IBEC BPL system). The Commission argues that there are BPL systems now operating in "more than 125 zip codes." In fact, looking at the database, (after one removes the entries for non-existent zip codes that are shown in the database), there are 200 zip codes listed in the online BPL database. None has been added since February of 2011. However, the vast majority of the facilities listed in these zip codes are "paper" systems which were never deployed; systems which were taken out of service; or systems that are in some planning stage which may or may not come to fruition or which are only offering service to customers within a small pilot area. The basis for the Commission's reference in the R&O to 125 zip codes rather than 200 is not explained. The fact is that the database has never been maintained with any degree of care despite repeated complaints and it

²⁵ Some of the errors previously reported by ARRL may have since been corrected but the majority are unchanged in the database. It remains flawed to the point of uselessness.

²⁶ UTC has no ability to do that. It is reliant on information from those few BPL companies now in existence and those which have abandoned BPL as a business plan. ARRL discovered recently in doing field measurements of IBEC systems that two IBEC systems were not included in the database. IBEC admitted to ARRL in correspondence dated January 27, 2011 that, due to what IBEC termed an "administrative oversight," 25 zip codes were not correctly input into the database, and one listed zip code was not in fact served by IBEC. ARRL's November, 2010 *ex parte* filing, noted that ARRL contacted the Shpigler Group in Livermore, CA which reported that it had ceased operation of the system, and had notified UTC of this fact. However, the database was not changed in response to the notice.

cannot serve and never has served as a means of addressing interference *post hoc*, even if *post hoc* interference resolution was practical.

8. That there is but one active interference complaint submitted by ARRL at the present time is not evidence that there is compliance by BPL systems with the Commission's rules; nor an indication of an incentive by BPL systems to attempt to mitigate interference to Amateur Radio stations or to attempt to address interference as it arises; nor an indication that the Commission's existing BPL rules are adequate to prevent interference to Amateur stations.²⁷ There are few active BPL systems, and fewer still that are not implementing full-time notching, so there are few complaints currently. However, the Commission refers in the R&O to a complaint about an IBEC system in southwestern Virginia. IBEC systems in operation in North Carolina, Virginia and Pennsylvania at one time did notch Amateur bands but stopped doing so.²⁸ The failure to notch Amateur HF bands resulted in severe interference to a fixed Amateur Radio station in Virginia. Neither is IBEC notching the United States government bands as required.²⁹ As noted above, ARRL filed a complaint with the Commission on December 30,

²⁷ At paragraph 35 of the R&O, the Commission claims that it did not base its assessment of the interference potential of BPL systems on any standard performance factor, such as an attenuation rate by itself, but rather on the "successful past performance of [its] existing standards and the availability of suitable approaches for managing the potential for harmful interference and correcting any harmful interference that may occur." The Commission cannot, however, as discussed herein, honestly claim that the present rules have been successful in preventing interference from BPL systems to Amateur Radio stations, or in resolving that interference after it occurs. The relative absence of interference cases since the initial rollouts of BPL test systems and initial deployments (which led to large numbers of persistent interference complaints everywhere such systems were deployed) is due to (1) the relative absence of BPL deployments since that time; (2) the willingness of most (but notably not all) of the few remaining BPL companies to notch all Amateur allocations voluntarily; and (3) the fact that the principal remaining BPL company, IBEC, is focused on providing BPL to rural electric cooperatives. Nothing in the reaffirmed BPL regulatory scheme can be said to justify the Commission's assessment of the interference potential.

²⁸ IBEC consistently represented to ARRL that it was notching Amateur HF allocations and demonstrated this in Virginia to ARRL and local Amateurs in Virginia. Its systems are not now notched on Amateur bands and the result has been the Virginia interference report.

²⁹ After ARRL filed its interference complaint with the Commission on December 10, 2010, IBEC claimed in correspondence to ARRL dated January 27, 2011 that although its equipment is notched to protect the "aeronautical bands" as a default setting, it can be adjusted during installation and repair. It claimed that it was "checking and rechecking" all of its equipment to ensure that the systems are rule compliant. However, ARRL's remeasurement of a system using IBEC equipment operated by the French Broad EMC in North Carolina in November, 2011 revealed that it is still not notched on United States government frequencies, in continued violation of the Commission's

2010 noting the interference and other rule violations with respect to three IBEC systems. *It has now been a year since that interference complaint was filed.* No action has been taken by the Commission. ARRL's investigation of the IBEC system showed further that its modems were operating at power levels so far above the permitted maxima that it was apparent that the OFDM-based modems that IBEC uses could not have been properly certified by the FCC Laboratory. On February 10, 2011, ARRL filed a written complaint with the Chief, Laboratory Division, OET, concerning this. No action has been taken and no communications have been received by ARRL with respect to this complaint to date, *ten months later.* All other interference complaints filed with respect to BPL systems from 2004 to date fared similarly. Yet, at paragraph 91 of the R&O, the Commission states: "(w)hether the extrapolation factor is 20 dB or 40 dB or somewhere in between is far less important than the fact that harmful interference must be corrected under any circumstances."³⁰ This Commission apparently is satisfied that its complete inaction over a period of a year on a complaint of BPL interference to a fixed Amateur station that the BPL operator refuses to address voluntarily (by implementation of notching) is consistent with the stated objective of the BPL rules, which is to ensure "...that any instances of harmful interference that may occur can be quickly identified and resolved."³¹ The one conclusion that follows from experience between 2004 and now is this: *in every case where interference to an Amateur Radio station has been experienced from Access BPL, the BPL system has not implemented or not continued to implement full-time notching of all Amateur allocations. BPL systems which have implemented and which continuously utilize full-time notching of all*

unenforced rules, and it and the IBEC systems in Virginia are still operating substantially over the radiated emission limit at the same locations reported in 2010- also in violation of the Commission's Rules. Of course, no Amateur band notching had been implemented either.

³⁰ Commissioner Copps, in his 2006 Statement with respect to the Order on Reconsideration in this proceeding, stated that the Commission "must be available and positioned to respond to interference complaints with alacrity. Amateur operators should not have to wait for months to get complaints resolved – they deserve better."

³¹ R&O, at ¶ 15.

Amateur bands, to a reasonable notch depth, have in general not created harmful interference to geographically proximate Amateur Radio stations. The conclusion from this is obvious.

9. It is readily apparent that (1) the rules are not sufficient as they stand to prevent interference *ex ante*; (2) the interference potential of BPL is far more substantial than the Commission will admit; (3) BPL operators have no incentive to voluntarily resolve interference absent enforcement action by the Commission; and (4) no enforcement can be expected because, *on balance*, the Commission has indicated loudly and clearly that it simply does not care enough about BPL interference to the Amateur Service to expend any significant resources to remedy it.³² The rules must therefore change to address the prevention of BPL interference. BPL companies can, and have, notched Amateur bands full time without adverse consequence. Where this has been done, interference has been prevented.³³

III. Information on Which the Commission Admittedly Relied in Adopting its Insufficient and Ineffective BPL Rules Shows that Access BPL has a Very Substantial Interference Potential, Requiring Full-Time Notching of Amateur Bands.

10. The R&O states that, in general, the Commission is not persuaded by, or disagrees with the voluminous authorities cited by ARRL in its comments and *ex parte* submissions in response to the Further Notice. However, other than ARRL's submissions, the comments of other parties (which do *not* rebut ARRL's technical submissions), and the documents released by Court order on which the Commission has repeatedly stated that it relied in adopting the BPL rules, the Commission has

³² In fact, in the Access BPL Order, the Commission threatened *Amateur Radio operators with sanctions* for filing what it loosely termed "frivolous" interference complaints.

³³ The R&O mischaracterizes ARRL's position (repeatedly). At Paragraph 17, the Commission claims that ARRL "essentially contends that the amateur service should be protected against any possibility of interference" from BPL operations and "demands that BPL operations not be allowed (sic) on frequencies allocated to the Amateur Service." That pejorative characterization is inaccurate. Full time notching of Amateur bands is at this point an industry standard. The Commission requires that the capability to do so be included in all Access BPL modems. Because there is not an Amateur station in every residence, interference is not manifest at all BPL locations, but if the system is using Amateur spectrum unnotched, interference is a *certainty*, and Amateur stations are ubiquitous. Therefore, full-time notching of Amateur allocations is the only preventative solution that will allow BPL to function effectively while not causing interference to Amateur Radio stations.

no other authorities of its own. Therefore, and despite the generalized statements that the Commission “disagrees” with ARRL’s technical filings or that it is “unpersuaded” by ARRL’s submissions, and its disingenuous attempt to distance itself from its own staff studies of BPL’s substantial interference potential, the record does not support a finding that the BPL rules as modified in the R&O are in any sense adequate. The materials released pursuant to the Court of Appeals’ remand order, which the Commission tried desperately not to release to the public, are at substantial variance with the Access BPL Order and the instant R&O post-remand. The R&O addresses this dissonance by discounting the source, mischaracterizing, and attempting to distance itself from the field measurements, studies, and recommendations of its own Technical Research Branch staff, on which it earlier admitted that it relied. The conclusions to be fairly drawn from the studies that the Commission was forced to release by the Court of Appeals are listed at Paragraph 30 of the R&O.³⁴ *See also Exhibit B* hereto, a technical critique of the R&O.

11. Former FCC Chairman Michael Powell, the self-professed “cheerleader” for BPL, in a Joint Statement concerning the Access BPL Order, claimed that:

³⁴ These included the following, briefly summarized:

- (1) Access BPL is by no means a point-source emitter; it is a distributive system that has significant interference potential over a wide area, at significant distances from (and along) the power line carrying BPL signals.
- (2) The proper distance extrapolation factor for assumed signal decay with distance from the power line is much closer to 20 dB/decade of distance ($20 \log R$) than to the 40 dB/decade of distance adopted by the Commission at frequencies below 30 MHz.
- (3) Access BPL has a high interference potential to licensed radio services, if operated at the maximum radiated emission levels permitted by the Commission’s Part 15 rules. (Interference to licensed mobile radio receivers is very likely for very long distances along a power line. Systems operating at the Part 15 emission limits will be 25-35 dB stronger than the median values of man-made noise at 30 meters distance. Mobile antennas closer to the lines raises the noise level even more.
- (4) If, in response to an interference complaint, the BPL operator reduced the BPL radiated emission level from the offending portion(s) of the BPL system by 20 dB below the maximum radiated emission level permitted for Part 15 devices generally, mobile facilities would not be protected. That BPL noise would be far higher than the level of ambient noise in residential environments. BPL wideband noise levels would preclude mobile communications long distances from the power line.
- (5) A reasonable course of action at the time was to ban Access BPL on overhead power lines, as a means of protecting licensed services from harmful interference in the High Frequency bands.
- (6) Measurement of BPL radiated emissions should be done at heights not lower than in the same horizontal plane as the overhead power line.