

**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

“A body of men, however upright and intelligent, are easily satisfied of what they wish to believe.”¹

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 respectfully requests that the Commission reconsider and modify the *Report and Order* (the R&O), FCC 04-245, released October 28, 2004, 70 Fed. Reg.1360 *et seq.* The R&O amended Part 15 of the Commission’s rules governing unlicensed radio frequency (RF) devices to adopt new requirements for Broadband over Power Line (BPL) technology. As good cause for its Petition, ARRL states as follows:

I. Introduction

1. The Report and Order in this matter represents a classic case of prejudgment by the Commission. It is readily apparent that the Commission long ago made up its mind² that it was going to permit BPL without substantial regulation no matter what the effect of this flawed

¹ James M. Coale, President, C&O Canal Company, reporting to stockholders on flawed prior estimates of the cost of construction of the C&O Canal, one of America’s most spectacular failures (1851).

application of old technology is on licensed radio services. Concerned only with achieving what he described as a “strategic goal of this Commission,” to “promote the availability of broadband to all Americans irrespective of platform”³ the Chairman (and the other Commissioners) has authorized a spectrum pollution source that has, time and again, been demonstrated to be incompatible with existing, licensed uses of the limited and unique High-Frequency (HF) spectrum. There are good methods of broadband delivery⁴ and bad methods. BPL is a bad method. It is been demonstrated, even in those few instances where BPL operators at test sites have attempted to cooperate in interference resolution efforts, that interference is extremely difficult or impossible to eliminate. Chairman Powell, in his Joint Statement (with Commissioner Abernathy) concerning the R&O, claimed that:

...only minimal regulations are appropriate. However, this does not mean that we have not been cognizant of the need to protect existing licensed services from interference. To address this issue, the Office of Engineering and Technology (OET) has done thorough testing of BPL systems to ensure the rules we are adopting protect existing governmental uses, amateur radio operators, and other licensees from interference.”

2. The Chairman’s remark is nonsense, given the record in this proceeding. The Commission’s OET staff has, as it turns out, done very little testing, and has only selectively released the results of what field tests it has done. In its delayed⁵ and incomplete response to ARRL’s Freedom of Information Act request for the test results on which the Commission relied in the adoption of the R&O, OET selectively redacted portions of field test results prepared by its own staff which, for example, had the following caption: “New Information Arguing for Caution on HF BPL.” OET staff has thus aided and abetted the predetermined outcome in this proceeding, and has

² According to the Commission’s Office of Engineering and Technology, in discussions with ARRL representatives early in this proceeding, some “promises were made” by FCC Chairman Powell, long before the R&O in this proceeding was adopted.

³ Joint Statement of Chairman Michael K. Powell and Commissioner Kathleen Q. Abernathy, released with the Report and Order.

⁴ Among these are cable modem, satellite, DSL, Wi-Fi, Wi-Max, and fiber-optic cable.

⁵ The staff released portions of its test results on January 4, 2005, more than two months *after* the release of the R&O!

deliberately covered up the “bad news” about BPL that it has had in its possession since prior to the release of the Notice of Proposed Rule Making in this proceeding. The Commission wanted nothing to contradict its enthusiasm about BPL, and OET saw to it that the entirety of the evidence of fundamental incompatibility between BPL and incumbent radio services in the HF spectrum was suppressed, ignored, or discredited by *argumentum ad hominem* allegations aimed at the messengers.

3. What little testing has been done by the Commission and released (late) to the public is not at all supportive of the conclusion that BPL has “little interference potential,” or that the interference potential can be easily mitigated or eliminated, by notching or otherwise. The technical record in this proceeding shows that BPL has a very substantial interference potential, and that the “mitigation” techniques available and relied upon by the Commission are neither effective nor, in most cases, even applicable to BPL interference to Amateur Radio stations. BPL operators are not required to meet any objective interference resolution benchmarks or timelines relative to interference complaints filed by licensees in the Amateur Service.

4. Neither the Commission’s Enforcement Bureau nor OET has, despite repeated promises to ARRL and the urgings of at least one Commissioner⁶ done anything about numerous, well-documented complaints about BPL systems. Not a single interference complaint has been resolved, except by the termination of the BPL tests. At the same time, the Chairman’s Office was telling the press that there is not an interference problem. ***The Commission has, as predicted, swept all interference complaints under the rug.*** The suppression of evidence contrary to the Commission’s predisposition in this matter requires a fresh look at BPL, a fair evaluation of its incompatibility with licensed radio services (including public safety), and the need to either prohibit BPL outright or substantially revise the ineffective and purely cosmetic rules adopted in this proceeding.

⁶ ARRL is most appreciative of the separate statement of Commissioner Copps in this proceeding urging timely interference resolution. Sadly, Commissioner Copps’ admonition has not been heeded by either the Enforcement Bureau or the Office of Engineering and Technology.

5. Finally, the Commission imposed certain obligations on BPL providers relative to interference mitigation or resolution with respect to government and public safety facilities. It failed, however, to apply those same obligations to interference incidents involving Amateur Radio stations. Amateur Stations are referred to as a mere hobby service, and therefore treated as though interference to that one service (ironically, the one which, due to very low desired signal reception levels at HF, is most subject to harmful BPL interference) is not of any consequence. There has been an intentional, conscious effort to stifle interference complaints about BPL, so that fewer such complaints would be filed, and so that the decision to permit BPL in the HF bands would be perceived as less of a gross policy mistake than it clearly is.

II. This Proceeding is Tainted by Evidence of Prejudgment

6. The Commission rushed ⁷ into this proceeding without sufficient information to determine whether or not BPL would or would not be compatible with incumbent licensed services in the HF bands.⁸ The Commission is bound by international treaty to protect the long distance

⁷ Veteran Representative Walden (R-OR), himself a radio amateur, on January 15, 2004, wrote to Chairman Powell, noted that the Commission was poised to release a Notice of Proposed Rule Making (NPRM) on BPL, and asked that the Commission withhold action on BPL until the public had an opportunity to review an upcoming publication of BPL interference testing by the National Telecommunications and Information Administration (NTIA). Representative Walden noted his serious concern that interference from BPL would have an adverse impact on the reliability of both Federal and non-Federal radio services. The Chairman simply refused to do permit a reasonable period for review of that bellwether report.

⁸ Knowing that NTIA was poised to release its two-volume BPL interference study (which was in fact released April 27, 2004), the Commission nevertheless denied ARRL's Motion to extend the comment date in this proceeding. The comment date remained May 3, 2004. On April 30, 2004 the Commission released its *Order Denying Extension of Time*, DA 04-1175, which suggested that anyone who wished to comment on the NTIA interference study could do so in reply comments. That, of course, is not the purpose of reply comments in a rulemaking proceeding. It is apparent that the Commission would not be pleased with the findings of NTIA's extensive field investigations, since they reveal substantial interference potential to Amateur and other licensed radio services operating in the HF bands. 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, far too large to authorize without substantial caution and further evaluation. See, *Potential Interference from Broadband over Power Line (BPL) Systems to*

communications capability of the bands between 5 and 30 MHz and to make “every possible effort” to reserve these bands for such communications”.⁹ Instead, the Chairman, described himself as a “cheerleader” for BPL, and made unjustified and unquantified assumptions that BPL would not result in interference to licensed services.

7. Though ARRL submitted extensive technical exhibits in its comments in response to the NPRM showing substantial interference potential of BPL, those studies were ignored. The NPRM in this proceeding had concluded prematurely that any interference to licensed services would be “minimal” but offered absolutely no empirical evidence that could allow the Commission to conclude such.¹⁰ The R&O did the same.

8. Chairman Powell, in his role as “cheerleader” for BPL, swept caution to the winds and embarked on a full-scale media blitz touting BPL, prior to the Commission’s consideration of the OET staff draft R&O. He visited the Raleigh, North Carolina test site, met with press and touted the benefits of BPL, but refused an invitation to witness at that same event, at the same time, a demonstration by radio amateurs of the interference potential of BPL from that same test site. He issued on July 14, 2004 a “news release” discussing his attendance at a demonstration of BPL at AT&T test labs that day sponsored by Pacific Gas and Electric Company and AT&T captioned “The

Federal Government Radiocommunications at 1.7-80 MHz, NTIA Technical Report 04-413 (Phase 1 Study) released April 27, 2004.

⁹ See the ITU Radio Regulations, RR 4.11

¹⁰ Actually, the coverup by the Commission of interference test results apparently began early in this proceeding. After a long delay, OET responded on October 1, 2003 to an ARRL FOIA request seeking any and all records of interference studies related to BPL. Among the items not released by the Commission at that time were measurement data taken on Current Technologies Power Line Communications System at Test House in Potomac, MD; Emission Measurement Data taken on Current Technologies Medium Voltage BPL System (22 April, 2003) and BPL Measurements in Allentown, PA – Results of Radiated Emissions Tests Conducted (May 19-22, 2003). The reason why these test results were not released then, according to OET Chief Edmond J. Thomas, was that they were either interagency memoranda, or the results of testing methods that are still under development for evaluation of BPL. It is unclear why BPL test methods were under development, but the Commission was nevertheless satisfied that BPL was ready to be deployed nationally on an unlicensed, and essentially unregulated, basis. In any case, those test results were not disclosed to the public and comments could not be filed with respect to them.

Future is Bright for Powerline Broadband.”¹¹ Finally, as further discussed below, Powell attended on October 12, 2004 a BPL demonstration and presentation in Manassas, Virginia in order to “view first hand the BPL services offered by the City of Manassas.”

9. The R&O in this proceeding was devoid of any technical analysis of the interference potential of BPL.¹² There were, instead, sweeping generalizations to the effect that the Commission believed that the interference potential of BPL is manageable. At paragraph 11 of the R&O, the Commission cited NTIA’s urging to proceed with BPL¹³ as being based on fulfilling the “President’s vision for universal affordable broadband Internet access.” This establishes the political nature of the decision in this proceeding. The President’s goal is restated in paragraph 12 as “one of the most important challenges currently facing the Commission and the communications industry.” The Commission’s decision was politically motivated and not based on science.

II. Chairman Powell Should Have Recused Himself from This Proceeding And His Failure to Do So Tainted the Proceeding

10. The Chairman’s cheerleading for BPL crossed the line on October 12, 2004 when he and the FERC chairman attended a presentation of BPL at Manassas, Virginia. This meeting violated the Commission’s *Ex Parte* rules. *Exhibit A* hereto includes the details of the event, and the case law addressing this issue. The Chairman tainted this proceeding by participating in that illegal *ex parte* presentation. The decision should be vacated and reconsidered after further input based on, among

¹¹ In fact, AT&T withdrew from the Menlo Park test shortly after Powell’s visit, and the test was terminated; hardly indicative of a “bright future” for BPL.

¹² The Commission ignored numerous technical studies filed by ARRL with its NPRM Comments, including Exhibit A, testing of the BPL systems at Emmaus and Whitehall, PA; Exhibit B, Power Line Carrier/HF Compatibility; Exhibit C, Extrapolation, Point Source vs Line Source Radiation; Exhibit D, Proposed Test Methods; and Exhibit E, Amateur Service Protection Requirements, Mobile Measurements.

¹³ NTIA’s position in this proceeding, including its late-filed comments submitted after the comment date had elapsed (a rather interesting event, given that the Commission refused to extend the comment date in this proceeding for members of the public, but readily accepted NTIA’s late comments, without any indication why NTIA could not have timely filed in the proceeding) is disingenuous, at best, given the findings included in its Phase I interference study.

other things, comments on a summary of the information received during that unlawful *ex parte* presentation.¹⁴

III. The Commission's FOIA Responses, Late and Incomplete, Demonstrate the Absence of Any Support for Its Conclusions Regarding Interference to Amateur and Other Licensed Services

11. The R&O in this proceeding, at paragraph 2, states that the “record and our investigations indicate that BPL network systems can generally be configured and managed to minimize and/or eliminate this harmful interference potential.” At paragraph 23, after stating its intention to protect licensed services from BPL interference, the Commission states that “[b]ased on extensive research, analyses and practical experience, we...continue to believe that the interference concerns of licensed users can be adequately addressed.” In the same paragraph, the Commission refers to its conducted “field tests”. At paragraph 39, the Commission states that the NTIA Phase 1 study “and our own field measurements” indicate that Access BPL systems are not efficient radiators, nor are their emissions “cumulative such that they permeate areas in which they are located.” At the time, however, of the release of the R&O, there had been no release whatsoever of the results, methodologies, or any other information at all about the Commission’s “investigations”, “extensive research, analyses,” or its “practical experience”. Nor had any information concerning the alleged “field tests” been disclosed. There was no way to evaluate the Commission’s conclusions.

12. Initially, ARRL filed an FOIA request in September, 2004, requesting documents that identified any field tests or evaluations of interference potential from BPL systems. This was a followup to ARRL’s 2003 FOIA request, to determine whether, since October of 2003, the

¹⁴ The R&O, at paragraph 137, attempts to explain the Chairman’s refusal to recuse himself from consideration of the BPL R&O at the Open Meeting, based on the conclusion of the General Counsel that no violation occurred “because the prohibition of Section 1.1203 does not apply to presentations deemed exempt.” That is a mischaracterization of the applicable rule and of the General Counsel’s letter. This was not an exempt proceeding, nor was the presentation exempt *a priori*. The General Counsel’s letter deemed presentations ***requested by the Chairman*** to be exempt, but even if that exemption applied, which it does not, the exemption in any case requires public notice of information about the presentation, which was not given, as discussed in **Exhibit A**, attached.

Commission had done any further interference tests. After the Commission asserted that a search fee would be required and essentially denied the FOIA request, ARRL modified the request on November 12, 2004 to seek those documents evidencing field tests on which the Commission relied, in whole or in part, in adopting the R&O in this proceeding. After additional delay, the Commission finally released to ARRL, with a cover letter dated January 4, 2005 (more than two months after the release date of the Report and Order in this proceeding), several hundred pages of information, falling into two main categories. The first, and by far the largest, consisted of letters and E-mail correspondence, principally complaints of interference to Amateur Radio stations from BPL systems addressed to Commission staff; and Commission internal circulation of those letters and E-mail correspondence. It established that interference complaints were plentiful and substantial, and not resolved.

13. The second category of documents consisted of presentations from the Technical Research Branch, OET to other Commission staff, regarding field investigations of BPL. The first of these discussed data gathered during a field test of the Amperion and Main.Net BPL installations in Allentown, PA in June of 2003. The study, according to the Commission's letter, was conducted in order to familiarize FCC with BPL operations and to develop measurement techniques.¹⁵

14. The second item in category 2 was a presentation representing data collected during an April, 2003 field test of the Current Technologies BPL installation in Potomac, MD, conducted "to familiarize FCC with the BPL operations and to develop measurement techniques."¹⁶ The third item

¹⁵ . It is unclear whether this is the same Allentown, PA field test that the Commission identified but refused to disclose in response to ARRL's 2003 FOIA request, which was allegedly conducted in May of 2003. If so, it is difficult to understand why this study was relied upon by the Commission in adopting its BPL rules in the R&O, but the study was not reliable to be disclosed to the public in 2003, in significant part because the measurement techniques were not sufficiently developed.

¹⁶ It is unclear whether this is the same report that the Commission refused to release in connection with the 2003 ARRL FOIA request. If so, it is not clear why the Commission relied on this study in adopting its R&O, having earlier stated that the results were not reliable because the measurement techniques were not sufficiently developed to disclose the report pursuant to ARRL's 2003 FOIA request.

was a presentation (apparently internal at FCC) representing data collected in a field investigation by FCC personnel of the BPL system in Briarcliff Manor, NY which has been the subject of (still unresolved and unadjudicated) harmful interference complaints. The fourth item consists of a presentation representing data collected in a field investigation by FCC staff of the Progress Energy BPL system near Raleigh, NC, which was the subject of a (never adjudicated) series of interference complaints. That system is now shut down. The last item in category 2 was spreadsheet data in support of these four presentations. The Commission had an obligation to release this information, on which it relied, in time for it to be evaluated by those interested parties filing comments. This it failed to do. Yet, the R&O relies on this data for its conclusions that BPL is not a substantial interference source.

15. It is apparent that the Commission's release of information pursuant to ARRL's FOIA request suppressed negative recommendations from its own technical investigations staff about BPL interference potential.¹⁷ ARRL finds nothing in the released data that supports the Commission's conclusions in the R&O at paragraphs 2, 23 and 39. See, the technical analysis in *Exhibit B*, attached. The released information, and the inexplicable redactions of unidentified material, by unidentified persons, establishes that the Commission failed to conduct impartial, reasoned rulemaking.

¹⁷ What was redacted from the Commission's release of the four field test presentations is interesting. In the June 13, 2003 Allentown presentation, for example, a large segment of the "conclusions" segment was redacted intentionally, evidencing non-compliance of the system. Regarding Amperion's system at Allentown, a large portion of the page marked "Compliance" was redacted; it apparently made some reference to non-compliance of some portion of the system. The entire "Recommendations for Amperion" segment is redacted, as are most of the "Recommendations for Main.Net." and the entirety of the "Conclusions Regarding Access BPL." and "Other Issues" pages. With respect to the Potomac, MD system, the entire "Conclusions" and "Recommended Future Tests" pages are completely redacted. With respect to the highly problematic Briarcliff Manor test site, after initially concluding that the notching implemented by the BPL system operator in Briarcliff Manor "performed poorly", the Commission completely redacted a page marked "NTIA results." The remainder of the Briarcliff Manor presentation redactions reveal the refusal of the Commission to disclose any information that might be adverse to BPL systems. In the "Other Issues" section of that presentation, the references to "Skywave (<30 MHz)"; "New Information Arguing for Caution on HF BPL"; "HF Issues and Options"; "Low VHF Options", and "BPL Spectrum Tradeoffs and Proposal" are all completely redacted.

IV. The Report and Order Fails to Substantively Evaluate The Interference Potential of BPL

16. In the Introduction portion of the R&O, the Commission repeatedly refers to BPL as a “new technology” or a “new broadband medium”. This is a misstatement of fact, made presumably in order to attempt to bring BPL within the statutory scope of 47 U.S.C. §157.¹⁸ Carrier current systems are not at all new. They have been around for decades. The transmission of broadband data to power lines is simply an attempted adaptation of an old technology, and itself is not new.¹⁹ Section 157 does not apply in this instance.

17. In some cases, the Commission simply mischaracterized the technical information in the record. For example, at paragraph 11 of the R&O, the Commission claims that the NTIA Phase I study on interference potential of BPL to federal government systems (Report 04-413) “helped confirm the localized nature of potential harmful interference from Access BPL systems and that aggregation of Access BPL emissions at ground-based radio receiver antennas will not increase interference risks.” This is not an accurate summary of the Phase 1 Study, or NTIA’s conclusions, which did not establish that harmful interference is in any sense “localized” (See *Exhibit C* attached). Nor has the aggregate effect of BPL signals yet been determined by NTIA. That is the subject of the Phase II study, not yet released by NTIA. What is clear from the NTIA Phase I Interference study is that, at current Part 15 levels (which were made applicable to BPL in the R&O), 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

¹⁸ That section states as U.S. policy the encouragement of new technologies and services to the public, and creates the burden on opponents of the new technology to demonstrate that the proposal is against the public interest.

¹⁹ Even Chairman Powell, in his cheerleading statement appended to the NPRM in this proceeding, stated that “(c)ompanies have struggled for years to make BPL a success and I am struck by the recent advancements and hurdles that have been overcome...”

extending to 75 meters, 100 meters and 460 meters from the power lines.²⁰ A reading of this conclusion would lead any reasonable person to conclude that these interference contours are far too large.

18. At paragraph 11 and 12, the Commission makes much of the NTIA (late-filed) comments as being supportive of BPL. However, the Commission either ignores the NTIA Phase I interference study, or misstates its conclusions. Notwithstanding NTIA's split personality in this proceeding, the Commission's obligation was to fairly evaluate the objective evidence before it in the proceeding. In this respect, it has failed.

19. The Commission cited as "supporting" comments those of the Association of Public Safety Communications Officers (APCO) and the National Public Safety Telecommunications Council (NPSTC). A fair reading of those comments, however, would reveal that the principal argument made was that interference was likely to public safety VHF low-band communications.

20. The Commission's conclusions regarding interference potential of BPL are both logically inconsistent, and consist entirely of summary, bare, terse conclusions without any specific analysis at all of the extensive engineering studies submitted by ARRL and others in this proceeding. At paragraph 23 of the R&O, the Commission finds that the harmful interference potential from Access BPL systems operating in compliance with the existing Part 15 emission limits for carrier current systems is "low" in connection with the additional rules it adopts. This is in direct conflict with the NTIA findings of substantial interference potential from BPL, absent additional interference avoidance measures recommended by NTIA which were *not* adopted in the R&O.

21. At paragraph 38, the Commission states, without any analysis at all, that it is "not persuaded by the arguments of ARRL and others representing licensed spectrum users that the current emission limits are insufficient to limit the general interference potential of these systems."

²⁰ NTIA Phase I Report, Executive Summary, at p. vi.

The Commission fails to explain the basis for this conclusion. It concludes that the 0 dB μ V/m limit is below the noise floor in the HF and low VHF bands and would be “unnecessarily” and “prohibitively restrictive” for Access BPL operators. The “below the noise floor” characterization is incorrect. The Commission failed to determine the level that is necessary to protect licensed services against harmful interference, but instead simply adopted an inapplicable standard, created for an environment of point source radiators.²¹ Furthermore, since actual interference cases have demonstrated empirically that BPL has repeatedly disrupted Amateur Radio communications up to ½ mile from a BPL modem, the Commission cannot continue to claim, as it has at paragraph 39 of the R&O, that the level of BPL radiation decreases significantly with distance perpendicular from the line, and the potential for interference decays rapidly with distance from the line.

V. The Commission, in Adopting an Unlawful Balancing Test, Unreasonably Discriminated among Licensed Services in Terms of Interference Protection

22. Having hedged on the interference potential of BPL, the Commission adopted cosmetic, ineffective interference mitigation provisions, which would in general obligate BPL providers to take unspecified after-the-fact actions to remedy interference once experienced and once reported by a Commission licensee. The Part 15 rules were developed, however, upon the fundamental premise, and on the condition, that interference is to be avoided *ab initio*, not remedied *post hoc*. Were it otherwise, the Commission would have no statutory jurisdiction to permit unlicensed operation of devices or systems. 47 U.S.C. § 301. The Commission relies in the Notice on 47 C.F.R. § 15.5, which generally obligates an operator of a Part 15 device or system to avoid harmful interference to

²¹ The 0 dB μ V/m threshold is necessary for protection of mobile operation. This would require 40 dB of attenuation of a BPL signal if the proper 20 dB/decade standard for signal decay is used. The 20 dB/decade standard is in fact the appropriate standard to use in evaluating interference contours from BPL radiation, as is discussed in Exhibit E., attached.

any authorized radio service or to cease operation. This, however, is not sufficient. *The principal obligation of the Commission in permitting unlicensed devices or systems is to establish a radiated emission level that is sufficiently low that by their operation the devices will predictably not interfere with licensed radio services.* The Section 15.5 non-interference requirement is a catch-all safeguard to cover the exceptional circumstances where interference occurs notwithstanding the prior determination and specification of the appropriate radiated emission level for such devices. In *Restricted Radiation Devices*, 13 RR 1543 (1956) the Commission held that:

Part 15 is based on the rationale that if radiation can be kept within certain fixed limitations, a general assumption can be made that such operations will normally not cause interference to interstate communications or otherwise will have interstate effects bringing such operations within the purview of those which must be licensed under Section 301 of the Communications Act. Accordingly, it is the Commission's position that these operations, as long as they do not exceed certain radiation limitations and do not in particular situations cause actual interference, may lawfully be carried on without a license.²²

Id., at 1544.

Shortly thereafter, in *Low Power Communication Devices*, 13 RR 1546e (1957), the Commission noted that the establishment of radiated emission levels sufficiently low to prevent instances of interference to licensed services and the prevention of interference (rather than the mitigation of it after the fact) was the *sine qua non* of authorizing unlicensed RF devices:

²² The assumption at the time was that Section 301 of the Communications Act of 1934, as amended, only applied to interstate communications. Such is not the case, and it has been clarified long since that Section 301 applies to both intrastate and interstate communications. See, *Pub. L. 97-259, the Communications Amendments Act of 1982*, H.R. Conf. Rep. No 97-765 at 31-32 (1982); reprinted at 1982 U.S.C.C.A.N. 2261, 2275-76. Section 301 of the Communications Act of 1934 states, in relevant part, that:

No person shall use or operate *any apparatus* for the transmission of energy or communications or signals by radio...except in accordance with this Act *and with a license* in that behalf granted under the provisions of the Act.²²

By enacting Section 301, Congress prohibited wireless transmissions without a license. The only (very limited) exceptions to this are set forth in Section 307 of the Communications Act of 1934, as amended, and none of those pertain to unlicensed devices generally.

The Commission recognizes that in permitting operation without an individual license, the user must be required to take precautionary measures in order to minimize the likelihood of interference to the authorized radio services. Such precautions, in fact, constitute the foundation for the regulation of restricted radiation devices.

These comments [of] AT&T are based upon a misunderstanding of the legal framework of Part 15 of the Commission's Rules. For their suggestions of treating the maximum radiation limits as norms and requiring a cooperative program of interference elimination between the owner of an interfering low power device and an interfered with licensed service, while appropriate for consideration in adopting rules for licensed services cannot, irrespective of their merits, be fitted into the framework of Part 15 of the rules, which relate to the conditions under which no license will be required under Section 301 for the operation of radio transmitting devices. The fixed maxima of radiation for the various devices are the limits of radiation at which they can generally be expected to operate without becoming devices which by their interference potentialities affect interstate and foreign commerce. The additional requirement that they do not cause interference is in recognition of the fact that even at these extremely low radiation limits they will in some special circumstances cause interference and thus their continued unlicensed operation would be illegal under Section 301 (footnote omitted). Consequently, short of adopting a licensing scheme of a type which would clearly be infeasible and much more burdensome on the public, we must adhere to the principle expressed throughout this part of the rules of determining fixed radiation limits and superimposing thereon a non-interference requirement.

Id., at 1546g-1546h.

23. Given the foregoing, three conclusions are apparent: (1) The Commission's fundamental obligation in permitting unlicensed devices and systems is that they not be permitted to radiate RF energy in sufficient amounts to cause interference; (2) The Section 15.5 non-interference condition is an overlay regulation, and not sufficient to justify the authorization of unlicensed devices with significant radiated interference potential; and (3) The entire regulatory framework is based on the prevention of interference at the outset, rather than mitigation of interference later. Licensed radio services are entitled to interference protection. The R&O, however, stands these precepts on their ear.

24. Instead of insisting that BPL providers limit radiation from their systems to levels which will protect licensed radio services, the Commission has, instead, "balanced" the inchoate benefit of BPL, an unproven broadband distribution method, against the interference to licensed services.

Worse, it has done so in a way as to create a hierarchy of licensed radio services and characterized them by how much interference each service deserves. This is untenable under Section 301 of the Communications Act of 1934, and the placing of the Amateur Service in the “back of the bus” is discriminatory and unreasonable.

25. At paragraph 23, the Commission states that “while some cases of harmful interference may be possible from Access BPL emissions at levels up to the Part 15 limits, we agree with NTIA that the benefits of Access BPL service warrant acceptance of a small and manageable degree of interference risk.” A balancing test of interference risk is prohibited under current spectrum allocation paradigms and the licensing requirements of Section 301 of the Communications Act, absent an objective determination at the outset that the operating parameters of the unlicensed services make the likelihood of harmful interference virtually nil, which is not established in the R&O, and clearly not established by information in the Commission’s possession.²³ Further, as NTIA has concluded, it is not a “small” nor “manageable” degree of interference risk.

26. At paragraph 24 of the R&O, the Commission concludes 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 potential for increased harmful interference that may arise.” There is no statutory underpinning for the application of a “balancing test” between interference from unlicensed facilities to licensed radio services based on the FCC’s preconceived conclusions about the social or economic benefits of the unlicensed service.²⁴ This creates the implication that interference to the

²³ Even if a balancing test could be found to apply, there is absent a practical ability to resolve interference immediately pursuant to the terms of the R&O. BPL systems are not required to shut down immediately upon a bona fide complaint. Instead, as will be discussed below, bona fide complaints have languished in the Office of Engineering and Technology for months at a time.

²⁴ In the Commission’s Regulatory Flexibility Act analysis, Item E of the R&O, the Commission admits that it balanced the “critical needs of licensed radio users against harmful interference with facilitating the development of Access BPL by removing regulatory uncertainties.” This is an inappropriate and unlawful criterion for authorization of unlicensed systems.

Amateur Service is not particularly important, relative to the Commission's crystal ball prediction of the value of this unproven application of old technology.

27. At Paragraph 24, the Commission concludes that it is not necessary to exclude BPL operations from any specific service allocations, except those reserved for international aeronautical safety operations. This acknowledges that there is at least a substantial risk of interference from BPL but classifies licensed radio services in order of perceived importance, and therefore determines the acceptable amount of interference risk from unlicensed devices. That BPL systems have to have the capability to avoid use of locally used frequencies is no consolation where there is no requirement to utilize that capability, and when it must be implemented.

28. At paragraph 53, the Commission states: "We similarly do not find that amateur radio frequencies warrant the special protection afforded frequencies reserved for international aeronautical and maritime safety operations. We note that in many instances amateur frequencies are used for routine communications and hobby activities. While we recognize that amateurs may on occasion assist in providing emergency communications, we believe that the general Part 15 provisions and the specific provisions being adopted herein for Access BPL operations are sufficient to protect these amateur operations." This conclusion is tantamount to saying that Amateur Radio is not very important and doesn't deserve to be protected from interference to the same extent as are other licensed services. The conclusion is contrary to numerous Congressional findings and declarations.²⁵ It also assumes, illogically, that protection of Amateur Radio communications from

²⁵ Congress has repeatedly acknowledged that Amateur Radio is far more than just a "hobby" and is deserving of protection. Public Law 103-408, a Joint Resolution, commends Radio Amateurs for their contributions to technology and emergency communications in times of disaster. It urges the Commission to continue and enhance the development of the Amateur Radio Service as a public benefit by adopting rules and regulations which encourage the use of new technologies within the Amateur Service and holds that "reasonable accommodation should be made for the effective operation of Amateur Radio from residences, private vehicles and public areas," and that "regulation at all levels of government should facilitate and encourage amateur radio operation as a public benefit." Public Law 100-594 states the Sense of Congress that volunteer amateur radio emergency communications have consistently and reliably been provided before, during and after floods, tornadoes, forest fires, earthquakes,

interference is somehow accomplished by the adopted rules, while protection of more important services is not, even though those other services (1) are typically located further away from power lines; (2) use receivers of considerably less sensitivity, and (3) typically utilize desired received signals of higher signal. On the other hand, the Commission at paragraph 49 agrees with NTIA that critical Federal government and other services specified by NTIA and public safety warrant “additional protection” from BPL interference. This hierarchy of licensed services that are protected from interference from Part 15 systems is a new construct, the authority for which does not exist in the Communications Act of 1934. All licensed services must be protected from interference from Part 15 systems and devices.

29. Amateur Radio operators are warned at paragraph 87 of the R&O by the Commission not to submit “frivolous” complaints of interference from BPL, upon threat of sanctions affecting licenses. This warning is clearly intended to “chill” interference complaints from licensed Radio Amateurs, who will be reluctant to complain of interference out of concern for sanctions from the Commission. The remedies for Amateurs are different as well. At paragraph 87 of the R&O, the Commission, upon a complaint of interference, will “take action” of an unspecified nature against the BPL operator found to be causing interference. If, however, the Commission uses its resources to investigate an interference complaint found to be frivolous, it will “impose appropriate sanctions” for abuse of its administrative process. It is unclear what constitutes a “frivolous” interference complaint, and it is unclear why the Commission does not specify what “action” it will take against

blizzards, train wrecks, chemical spills, and other disasters, and that Congress “strongly encourages and supports the Amateur Radio Service and its emergency communications efforts” and that “Government agencies shall take into account the valuable contributions made by amateur radio operators when considering actions affecting the Amateur Radio Service.” Given these statements of national policy, the Commission has unreasonably denigrated the Amateur Service in the R&O, and has discriminated against the Amateur Service in creating rules which provide insufficient protection of Amateur Radio from unlicensed BPL operations while at the same time protecting other licensed services to a far greater extent.

an interference-causing BPL operator but will impose “sanctions” against the complainant if, using a non-specific yardstick, it finds an abuse of process by the complainant.

VI. Interference “Mitigation” Rules are Ineffective and Are Applied Inequitably

30. At paragraph 38 of the R&O the Commission recognizes that some radio operations in the bands “being used” for Access BPL, such as those of Amateur Radio licensees, may occur at distances sufficiently close to power lines as “to make harmful interference a possibility,” it believes, (once again, without analysis or explanation) that BPL providers can use interference avoidance techniques such as frequency band selection, notching, or “judicious device placement” to remedy interference *post hoc*. There is no explanation why avoidance of Amateur bands or notching is not required in the first place, other than that the Commission “does not think it is necessary.” The R&O, however, does preclude use by BPL systems of bands allocated for certain other services which have considerably less likelihood of being subjected to interference from BPL. In the same paragraph, the Commission states that it does “not see evidence” that BPL will “significantly contribute RF energy to generally raise the background noise level.” This conclusion is without any support and ignores ARRL technical submissions. As discussed in Exhibit B, attached, the Commission’s own measurements, though minimal, do establish that the BPL systems under test did significantly contribute RF energy to generally raise the background noise level.

31. At NTIA’s request, the R&O creates geographic coordination areas within which BPL systems must coordinate with Federal government and “certain other radio operations.” It is unclear why this is necessary for Federal systems *not* generally proximate to power lines, but it is not necessary in order to protect Amateur operations, which are typically geographically proximate to overhead power lines. NTIA argues that coordination areas, excluded bands, and exclusion zones would “virtually eliminate certain interference risks for even the most sensitive and vulnerable

Federal government and other radio services.” That same test should be applied in determining the rules needed to avoid interference to the Amateur Service. The basis for the distinction is not stated. The coordination and exclusion zones would address coast station, aeronautical mobile and radionavigation services used to provide safety of life services. Coordination with Amateurs is no more burdensome, however, and should have been, but was not, required of BPL operators. As justification for the creation of excluded bands, the Commission states at paragraph 49 that “the distributive nature and other technical characteristics of Access BPL pose somewhat higher potential for interference than point-source wireless broadband systems that warrant additional protective measures.” *This is exactly the rationale for restricting BPL operation on Amateur bands*, and identifies characteristics of BPL systems that are largely discounted by the Commission at paragraph 39 of the R&O.

32. Avoidance by BPL operators of the numerous excluded frequencies is found not to be burdensome for Access BPL. The Commission, however, finds that it would be burdensome for them to avoid use of Amateur frequencies. This distinction is not explained. In fact, PowerWAN claims that it already excluded the use of Amateur bands. So it is apparently not burdensome to do so. The record in this proceeding and the empirical evidence from the numerous unresolved and unadjudicated interference complaints establishes that there is a serious interference problem, given the application of Part 15 radiated emission levels to BPL, which could be ameliorated, though not eliminated, by excluding Amateur allocations from the frequencies on which BPL could be operated. Why the Commission believes it to be “burdensome” to BPL systems to avoid Amateur allocations remains a mystery.

33. The provisions discussed at Paragraph 50 of the R&O for “consultation” (i.e. coordination) between BPL systems and certain licensees require detailed disclosures to certain

services, and sufficient detailed information sufficient to determine the interference potential of the BPL system to the licensed service. That same information is not required to be disclosed in the publicly available database or otherwise to Amateurs, who must just wait for the interference to occur before identifying it and determining how to deal with it, instead of coordinating (or “consulting”) in advance. There is no reason why BPL systems should not have to provide the same consultation with Amateurs as they do with other services.

34. BPL systems are not required to shut down operation in the event of interference except as a “last resort.” In practice, to date, this has meant that the systems will never have to shut down, even though the BPL operator will have proven ineffective at remedying serious, ongoing harmful interference to the Amateur Service. The Commission claims at Paragraph 58 of the R&O that the need to resolve interference claims quickly without cessation of service is to avoid the tension that would be created on the part of BPL subscribers. Therefore, for the first time in Commission jurisprudence, the Commission is authorizing an unlicensed service that it knows, by record evidence, has significant interference potential to licensed radio services. The alleged “mitigation” provisions do not include immediate shutdown of the unlicensed facilities because of the priority given to the unlicensed operation, regardless of the preclusive effect on the licensed radio service or the duration of the interference.²⁶

35. The Commission sees “no basis for subjecting Access BPL systems to requirements for addressing interference complaints that are different and more stringent than our procedures for addressing interference from other types of unlicensed devices” (R&O, at ¶ 9). There is ample basis

²⁶ The Commission states in that same paragraph that the concern expressed by ARRL and others that the mitigation provisions will not be sufficient is “misplaced.” Protection, it says, will be provided by (1) the emissions limits (2) the provision for consultation areas, excluded, bands, and exclusion zones, and (3) the requirement that Access BPL systems not cause interference. As to these, (1) is clearly not sufficient, as has been demonstrated repeatedly by ARRL; (2) does not apply to Amateur Radio Service interaction with BPL under the rules adopted in the R&O, and (3) the unenforceable, and predictably unenforced non-interference requirement is not a practical remedy. The mitigation provisions may “allow” BPL providers to resolve interference, but they have no incentive to do so, and Section 15.5 is *post hoc*, not an interference avoidance mechanism.

for such a distinction, however: (1) BPL is not a point source radiator, but is distributive; (2) BPL is a broadband system that simultaneously interferes with large band segments involving multiple radio services rather than discrete frequencies; and (3) BPL systems have high duty cycles, and operate constantly rather than intermittently or for brief periods. The fact that the Commission intends to do “business as usual” with BPL interference complaints even though it admits that BPL has a higher interference potential than other Part 15 systems and devices is an abandonment of its fundamental obligation to avoid interference in telecommunications systems.²⁷

36. There is no timetable in the rules for response from BPL operators to complaints from Radio Amateurs. The licensed service interference victim is expected to investigate the interference first and insure that it is not a “receiver system malfunction” and to determine that the interference is outside the complainant’s premises. The BPL operator is afforded the luxury of “prioritizing complaints” according to some unspecified and unregulated priority schedule that is left to the discretion of the BPL operator. Public safety complaints, on the other hand, must be responded to within 24 hours. If a 24- hour response time to interference complaints is possible for BPL systems, it should be the same standard for amateur interference complaints as for public safety interference complaints. To hold otherwise is completely arbitrary.²⁸ There is no explanation for the distinction.

37. Shutdown features and notification of customers of potential BPL service interruptions due to interference were suggested by ARRL and others. The capability of shutdown of individual

²⁷ The adopted procedure for interference resolution is first to require the complainant to initiate contact with the BPL provider and beg for resolution. If that does not resolve the interference, the complainant gets to beg the Commission for intervention. No intervention is promised or assured. The Enforcement Bureau and the Office of Engineering and Technology will “review the complaint” and “take appropriate action” What action, and when it will be taken, is not stated. In ARRL’s experience, this takes many, many months, if indeed any response is forthcoming.

²⁸ At paragraph 93 of the R&O, the Commission cites NTIA comments claiming that BPL operators have a “market incentive” to prevent interference. The only incentive that BPL operators would have to prevent interference is the threat of FCC enforcement, which is not a real threat based on FCC response to date to interference complaints. Interference to radio amateurs is otherwise of no effect, since there is no jurisdiction other than at FCC for interference resolution. No civil action, for example, is possible.

system components is required by the R&O at paragraph 72 and 73. However, the Commission stresses that it is not the first step in a system operator's response. It is instead a "last resort" when all other efforts to satisfactorily "reduce" (not eliminate) interference have failed. The Commission is identified as the sole authority that may direct an Access BPL operator to cease operating. No notification of customers of potential service interruptions is required.

38. Much is made by the Commission of the practicality of "notching" of Amateur bands as a means of interference "mitigation". Notching, however, has proven difficult to implement effectively and has not been successful generally in remedying BPL interference at test sites. In any case, notching requirements are not imposed on spectrum used for HF operations. The Commission states, without explanation, that it "believes" that the three classes of other "mitigation" requirements²⁹ are sufficient. BPL systems must only be able to preclude transmissions in bands of at least 3 kHz on frequencies below 30 MHz. This is insufficient to cause entire Amateur bands to be notched, and ARRL's experience is that, in most cases, attempted notching of Amateur bands does not result in notching the entire band. The Commission concludes that on bands below 30 MHz, 20 dB of notching below the current Part 15 limits is sufficient to resolve or avoid interference. There is no technical analysis that supports this. It is premised in part on the assumption that a mobile station can relocate to create separation between the BPL overhead line and the receiving antenna. It concludes that notching plus "some distance separation" will "generally" avoid interference to fixed operations.³⁰ The amount of separation is not specified, nor is there any technical basis stated for this conclusion. It is a requirement imposed apparently on the licensed service station to move its

²⁹ Emission limits, consultation areas, excluded bands, exclusion zones, and the non-interference requirement.

³⁰ At paragraph 38 of the R&O, the Commission states that good engineering practice includes locating "sensitive receiver antennas as far as practicable from power lines." This is of course not possible with respect to Amateur fixed stations, which are located essentially by definition at licensees' residences. Neither are mobile stations in control of their operating location, as a general matter. Nor is it reasonable to demand reconfiguration of licensed radio services to accommodate spectrum-polluting Part 15 devices and systems.

antenna, which cannot be easily done in the ARS, and is pointless in residential neighborhoods permeated by BPL radiated emissions.

39. At paragraph 130 of the R&O, the Commission refuses to require BPL systems deployed before a date 18 months after publication of the R&O in the Federal Register to come into compliance with the new rules, unless the system causes harmful interference and the operator fails to take necessary steps to eliminate occurrences of harmful interference. *As the result of this holding, and given the language of the revised Section 15.37(l), it is apparent that the BPL facilities installed before July 7, 2006 never have to come into compliance with the new rules!* This is absurd. As incomplete and ineffective as the new rules are, a BPL system not yet in operation cannot be allowed to skirt the rules supposedly limiting interference potential permanently.

40. Finally on the subject of “mitigation” techniques, the publicly accessible database of BPL operations, which need only include the location of an installation by zip codes served, type of modulation used, frequency bands of operation, and a contact person, who need be available only during normal business hours, is useless in addressing instances of mobile radio interference, which must be avoided, rather than remedied. Public safety communications are not protected at all by this requirement.

VII. The Commission has Failed to Respond to Harmful Interference Complaints From BPL Test Sites

41. ARRL’s experience to date has confirmed that the Commission cannot be relied on to address the interference cases that require its intervention. The recitation in *Exhibit D*, attached, reveals the circumstances of the Commission’s complete inaction to date in adjudicating complaints filed concerning test sites. If the Commission has even visited these sites, it has not contacted the complaining radio amateurs in the area, nor communicated with them.

VIII. The Commission’s Adopted Measurement Standards Are Incorrect

42. The NTIA Phase 1 interference study recommended measurement of BPL emissions at a fixed measurement distance of 10 meters, using a height roughly equal to the power line height, using an adjustment factor for higher emissions at higher elevation angles, making measurements with a rod antenna below 30 MHz instead of a loop antenna. ARRL agreed with those recommendations. They were in each case based on sound science. None of these recommendations was adopted by the Commission.

43. NTIA, in a September 24, 2004 letter to the Commission, retreated inexplicably from its argument for a 5 dB height correction factor, (to avoid the need to search for a peak field in the height dimension) and now claims the factor is not needed below 30 MHz except as an alternative to varying the measurement antenna height as proposed by FCC. Thus, the Commission has allowed multiple measurement standards. Since measurements at 1-4 meters of height are allowed, the results of radiated emissions testing will be misleading since the maximum radiation is not at 4 meters, but much higher.

44. Though the Commission retained *in situ* measurement requirements for Access BPL systems, it decided that it was not practical to measure radiated emissions at fixed distances of 10 and 3 meters. So, distance extrapolation will be necessary. The Commission rejected ARRL's and ARINC's recommendation of a 20 dB per decade extrapolation factor and uses the existing 40 dB per decade factor in Part 15 for frequencies below 30 MHz, using slant-range rather than horizontal distance. The 40 dB per decade factor is unreasonable for BPL systems. It underestimates the actual field strength at 30 meters by as much as 11.5 dB. The technical study submitted as *Exhibit E* hereto justifies this conclusion, and the Commission's revisiting of measurement issues and standards.

45. NTIA's recommendation for antenna height for measurements and a correction factor was adopted only as an alternative procedure, not a mandatory one. This is illogical. There should be

only one measurement standard; otherwise, there will be substantial differences in maximum radiated emission levels and no objective means of evaluation of a compliant system. Allowing multiple standards allows both cherry picking, and waffling by BPL operators who do not wish to comply with the limits. Similarly, NTIA's recommendation for measurement all along a 1200-meter section of the connected power line wiring was rejected on the basis that it is "burdensome" for BPL operators. Yet, the Commission admitted that the wiring may be many miles long, and the maximum emission from the system often occurs further down-line from the coupler than the one-wavelength maximum adopted in the Rules. This admits the distributive nature of Access BPL, not conceded by the Commission earlier, and does not contribute to a determination of the maximum radiated emission level.

Therefore, for all of the above reasons, ARRL, the National Association for Amateur Radio, respectfully requests that the Commission reconsider, rescind and re-study in further proceedings the rules governing Access Broadband Over Power Line systems in accordance with the foregoing.

Respectfully submitted,

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