

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of:

**Amendment of Part 15 regarding new requirements)
and measurement guidelines for Access Broadband) ET Docket No. 04-37
over Power Line Systems)**

To: The Commission

COMMENTS OF RAY SOIFER

Ray Soifer, pursuant to Sections 1.415 and 1.419 of the Commission's Rules [47 C.F.R. §§ 1.415 and 1.419], hereby respectfully submits comments in response to the Notice of Proposed Rule Making, FCC 04-37, 69 Fed. Reg. 12612, released February 23, 2004 (the Notice).

1. I am an FCC-licensed amateur radio operator, holding an Amateur Extra Class license (W2RS) as well as a degree in Electrical Engineering from Massachusetts Institute of Technology. I maintain and operate fixed, mobile and portable stations utilizing all authorized amateur bands from 1.8 through 450 MHz, and have published numerous technical articles in amateur and professional journals in the U.S. and overseas.

2. I filed comments and reply comments in response to the Notice of Inquiry, ET Docket No. 03-104, FCC 03-100, 68 Fed. Reg. 28182, released April 28, 2003 and corrected May 23, 2003 at 68 Fed. Reg. 32720 (the NOI, and, collectively, the NOI Comments). Because many of the points discussed in the NOI Comments are also relevant to issues raised in the Notice, the NOI Comments are hereby incorporated into these comments by reference.

3. Due to the likelihood of severe and harmful interference to amateur stations, the NOI Comments urged the Commission not to permit the deployment of Access BPL at this time, until considerably more testing and development has been done. In the Notice, the Commission proposes to go forward with Access BPL, including proposed technical capabilities and administrative procedures "to ensure that the potential for harmful interference is minimized and that any instances of harmful interference are quickly resolved¹." The Commission seeks comment on these proposed requirements and measurement guidelines.

4. The proposed requirements and measurement guidelines, in their present form, are insufficient to protect licensed amateur stations from harmful interference. Moreover, some significant issues, such as interference resulting from harmonics and intermodulation products, are not addressed in the Notice at all. These comments will consider these problems and propose ways to address them.

5. In its Phase 1 study report released April 27th² (the Phase 1 Report), NTIA evaluated interference risks using NEC models for four types of stations. These risks were gauged from the size of geographic areas in which BPL emissions, at the existing Part 15 emission limits, would reduce the ratio of desired radio signal power to ambient noise power by amounts which NTIA describes as being associated with moderate and high probabilities of interference, i.e., reductions of 3 dB and 10 dB in signal-to-noise ratio, respectively³. From my own amateur operation, I can confirm NTIA's assessment of interference probabilities; a reduction of 3 dB in S/N ratio corresponds to a doubling of noise power, and a reduction of 10 dB corresponds to the noise power being a full ten times stronger. Many long-distance (DX) communications in which

¹ § 33.

² *Potential Interference from Broadband over Power Line (BPL) Systems to Federal Government Radiocommunications at 1.7-80 MHz, Phase 1 Study*, NTIA Report 04-413, April 2004.

³ *Ibid.* § 9.3.1 at 9-4.

I have engaged would not have been possible in the presence of such reductions in S/N ratio. In addition, the NOI Comments illustrate the very weak signals encountered in amateur satellite communication.

6. For the fixed station, NTIA concluded that at 15 MHz and 25 MHz, respectively, signal power from one BPL system reduced S/N by 3 dB (moderate probability of interference) at 50% of the locations within 310 and 400 meters of the power lines, and by 10 dB (high probability of interference) at 50% of the locations within 175 and 230 meters of the power lines. The distances required to reduce signal power below the 3 dB and 10 dB levels in all cases were 770 and 450 meters, respectively.

7. If NTIA's model is correct, only amateur stations on large farms, ranches or estates in the most rural of areas would be able to assure that their antennas were so far removed from power lines as not to experience a high (10 dB) probability of interference, let alone a moderate probability (3 dB)⁴. The vast majority of amateur stations, my own included, are located in suburban or urban areas where such distances are not practical.

8. The Notice, at § 35, suggests that "many amateurs already orient their [high gain outdoor] antennas to minimize the reception of emissions from nearby electric power lines." Unless the desired, distant amateur station being received happens by coincidence to be at the precise beam heading that also minimizes power-line interference, this is likely to prove self-defeating in many instances, since turning the antenna away from the desired station would reduce the strength of its received signal, often drastically depending upon the directivity of the antenna and prevailing propagation conditions.

⁴ Even if located on so large a property, such distances would generally be impractical anyway, due to transmission line losses, not to speak of cost (770 meters being approximately half a mile).

9. The Phase 1 Report cites various problems with the measurement procedures currently specified in Part 15 and those used by some BPL proponents, and proposes alternatives⁵. I strongly urge the Commission to adopt NTIA's proposed compliance measurement procedures, and to take the results into account in its rulemaking.

10. NTIA surveys the regulation of BPL in other countries, including several which have authorized BPL only to discontinue it when interference to licensed services proved to be too much of a problem⁶.

11. Among the other significant issues raised in the Phase 1 Report is the aggregation of emissions from BPL systems via ionospheric propagation, which the report identifies as a topic requiring further study⁷. The possibility of interference to amateur satellite uplinks, discussed in more detail in the NOI Comments, requires further study as well.

12. The Phase 1 Report is just that, a report on the first phase of an ongoing study whose results will be essential. I strongly urge the Commission to await the concluding phase of NTIA's study before reaching conclusions of its own.

13. Neither the Notice nor the Phase 1 Report mentions possible interference caused by harmonics of BPL signals. These can be produced within power line systems themselves, or by non-linear devices nearby, and depending upon the specific circumstances, could cause harmful interference at frequencies much higher than those used by the BPL system itself. Similarly, intermodulation products can occur between any strong signals which may be present in a geographic area, including those from BPL systems. Anyone with much practical experience in radio-frequency systems can attest to the likelihood of such problems developing in many

⁵ *Ibid.* § 9.3.2 at 9-6.

⁶ *Ibid.* § 3.2.2 at 3-2.

⁷ *Ibid.* § 9.4(e) at 9-9.

environments. Work needs to be done on them before proceeding with the deployment of Access BPL.

14. The Notice, at § 34, states that all unlicensed devices operating under Part 15 are subject to the condition that they do not cause harmful interference and that they cease operation if they do cause such interference, citing 47 C.F.R. § 15.5(b). However, the next paragraph of that section goes on to specify the procedure under which such cessation of operation would take place: "The operator of a radio frequency device shall be required to cease operating the device *upon notification by a Commission representative* that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected⁸." (Emphasis supplied.)

15. Also at § 34, the Notice claims that "Access BPL will operate in compliance with the current Part 15 rules that limit emissions from unlicensed carrier current systems to very low power levels in comparison with licensed radio operations. We believe that the current Part 15 levels will limit the harmful interference potential of Access BPL devices to relatively short distances around these devices." As discussed earlier in these comments, the analysis presented in the Phase 1 Report leads to a very different conclusion⁹.

16. Under the procedure currently specified in Part 15, if a BPL operator is unable or unwilling to eliminate harmful interference to an amateur station when so informed by the amateur licensee, the amateur would have no remedy other than to contact the Commission and ask that a Commission representative investigate and, if appropriate, take action¹⁰. Not only is this procedure cumbersome and time-consuming, during which the harmful interference would

⁸ 47 C.F.R. § 15.5(c).

⁹ §§ 6 and 7, *supra*.

¹⁰ § 14, *supra*.

continue, but if the analysis in the Phase 1 Report is anywhere near correct, so many cases would result that a substantial administrative burden would be imposed on the Commission as well.

17. Some proponents argue that adaptive technology would enable BPL systems to "notch out" specific frequencies. While it is easy to see how this might enable such systems to protect *themselves* from interference from a local transmitter, the BPL system would not be capable of knowing the frequency or frequencies to which an amateur station is *listening*¹¹. The Notice acknowledges this, in another context, when discussing public safety services at § 37, but does not go on from there to draw the only logical conclusion.

18. That conclusion is that the only practical way to protect most amateur stations from harmful interference, short of prohibiting Access BPL itself as some countries have done¹², would be to require that *all* amateur frequencies be "notched out" to a suitably low level of emission, far below what is currently permitted by Part 15. When NTIA's ongoing study is concluded, hopefully it will provide enough data on the interference levels which can be tolerated by various types of government stations that such data can be used to develop practical recommendations for specifying "notched" interference-level requirements for the amateur bands as well.

¹¹ Most amateur operators spend far more time listening, e.g., tuning around the bands to identify stations they would like to contact and finding clear frequencies on which to transmit, than actually transmitting. Equipment manufacturers know this, and frequently specify transmitting duty cycles as low as 10% (i.e., transmitting 10% of the time and receiving 90%). Much amateur operation involves transmitting on a different frequency than is being received. This is especially true of long-distance (DX) communication, where large numbers of calling stations would often render the sought-after distant station inaudible were they to call on its frequency, or where differences exist in frequency allocations from one country to another. In the case of amateur satellite communication, technical considerations virtually mandate that the receiving and transmitting frequencies be in different bands. For example, the earth station might transmit in the 144-146 MHz band but listen at 28-29.7 MHz (AMSAT-OSCAR 7) or 435-438 MHz (Fuji-OSCAR 29). Numerous other combinations of transmitting and receiving bands are utilized by amateur radio satellites, both existing and awaiting launch.

¹² See footnote 6.

19. Even such a requirement, however, is unlikely be sufficient to remedy problems caused by harmonics and intermodulation products. As noted earlier, more work is needed before moving forward¹³.

RESPECTFULLY SUBMITTED,

/s/

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May 3, 2004

¹³ § 13, *supra*.