

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

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

**COMMENTS OF:
WESTERN ILLINOIS AMATEUR RADIO CLUB**

The Western Illinois Amateur Radio Club (WIARC) of Quincy, Illinois, submits these comments in response to the Notice of Proposed Rulemaking (NPRM) in the above-entitled proceeding released February 23, 2004.

The Western Illinois Amateur Radio Club was founded in 1940 by a group of radio amateurs and experimenters under the name Western Illinois Radio Club. It was formed and is still based in Quincy, Illinois, a city that many consider the radio equivalent to Silicon Valley. Our city was the launching pad for many great radio entrepreneurs, including Parker Gates (Gates Radio Co.), Bill Lear (Lear Jet and King Radio), and Elmer Wavering (co-founder of Motorola). The Western Illinois Amateur Radio Club has been privileged to count among its members some of the best and brightest in the radio communications industry. The club now has more than 100 active members, all licensed amateurs, ranging in age from ten to ninety. We support Adams County and the surrounding region with emergency communications efforts (such as during the tornado that hit West Central Illinois and Northeastern Missouri in May of 2003), and health and safety communications for high school cross country track meets. We assist the local counties with disaster communications planning. We support local schools by organizing kid's radio clubs; we conduct Boy Scout radio merit badge courses, and regularly give amateur operator classes and license exams to encourage new additions to the hobby.

The Western Illinois Amateur Radio Club recognizes the importance of making broadband internet service available to the entire country, and agrees that a number of disparate technologies may be required to achieve this end. Access BPL could become an important component in this endeavor. However, it is essential that the regulations that govern this new technology be carefully crafted so as to not allow encroachment on proven, existing services. Further, the rights of licensed services should clearly take precedence over this unlicensed technology, and sufficient safeguards should be put into place to make certain that these rights are not trampled in the rush to implement an unproven new technology.

In consideration of the above position, we hereby respectfully submit to the Commission the following comments, suggestions and observations, in response to the issues raised in the subject Notice of Proposed Rulemaking:

II. 22. *“Signals on power lines will tend to cancel each other out.”*

Power lines that carry BPL signals have the potential to act as unintentional long wire antenna radiators. The amount of radiation depends on the symmetry of the network at radio frequencies.

Typically, power line wires are spaced 6 to 12 feet apart, making them an effective radiator at HF frequencies. In a perfect system with balance lines and proper termination to the line, most of the energy would not radiate. However it is well understood by RF related industry professionals, that such parallel line systems must be designed with this purpose in mind and constructed with care to maintain the characteristics that result in low leakage (signal radiation). It is virtually inconceivable that the typical

existing AC power line distribution system can meet these stringent design and construction requirements and thus meet the low radiation requirements of Part 15. With Access BPL, any impedance unbalance in a transmission line - in the form of a transformer, relay, stubs or other components - can unbalance the system. This unbalance may produce radiation directly or by reflections of signals on the line forming standing waves. Any imbalance will cause unsymmetrical signals and will become interfering common mode currents. These currents will need to be suppressed. The high standing waves would also cause high voltage points of RF, which would add to the radiation.

Part 15 mainly addresses point source radiators and Access BPL systems cannot readily be viewed as point signal sources. Each impedance discontinuity raises the probability of signal leakage and resulting interference.

Part 15 must require that all future Access BPL systems be carefully tested to verify emissions levels and thus demonstrate compliance with signal leakage limits. Results of all tests for a BPL system must then become part of the system public file along with a system diagram showing all elements of the system. The file must be maintained and made available at a local level for examination by the public. Also to be contained in the file are the system operator contact information and the detailed interference resolution process the operators has established to resolve complaints.

II. 24. *“Main.Net further indicates that it has successfully implemented its technology in trials and commercial operations in over 60 locations in 25 countries throughout the world.”*

Where have these tests taken place? Why are there not test results available from these locations that document the levels of interference experienced? (As the NAB has observed, “very little actual test data has been submitted into the record”.) Why do anecdotal reports coming from other countries indicate that excessive levels of interference have been experienced? Why have there been only a limited number of tests performed in the United States? Furthermore, why have amateur and public safety service operators not been invited to observe these tests, and why have definitive test results from these test sites not been made available to the public?

Larger scale studies must be performed, and they must include locations that have overhead power lines located in established neighborhoods with mature power grids and with a significant number of amateur radio operators living in the test areas. Teams of observers should be established in these areas to observe and document the tests, composed of the representatives of all parties potentially affected by the interference: FEMA, military and National Guard, aircraft operators, amateur radio operators, public service and humanitarian organizations. Special attention should be given to testing near hospitals, to observe potential interference to medical electronic equipment.

III. 33. *“We recognize that unlicensed operations in the HF band present a number of unique challenges, given the propagation characteristics of this range of frequencies”.*

Skywave propagation has the potential to carry any generated interference for vast distances, causing a cumulative interference effect that would raise the noise floor nationwide and make it difficult to pinpoint a single interferer. In order to minimize this problem a technique must be developed and incorporated into each system to make it possible to identify the individual signal sources for each system. Without this signal ID, resolution of interference from sky wave-propagated signals will be very difficult.

“We are proposing to subject Access BPL operations to the existing Part 15 radiated emission limits for carrier current systems”

The existing radiation limits in Section 15.209 (30 uV at 30 Meters from 2 to 30 MHz) are excessive from the perspective of the amateur radio service. Amateur radio operation in the high frequency (HF) radio spectrum concentrates on the capture and effective use of weak signals for long distance communications. Communications are achieved around the world on a daily basis with signal levels of much less than a

microvolt using Continuous Wave Morse Code (CW) as well as a variety of digital data transmission protocols. The existence of local interference levels several orders of magnitude above these signals will completely obliterate any chance of reception, and yet the offending interferer may be perfectly legal under Part 15 limits. Historically, this has been of limited concern as relates to Part 15 devices, as these have typically been a point-source interferer limited to a single geographic location that could be easily identified and mitigated. However, Access BPL will envelope entire communities, as there are few places in any urban environment that are more than 30 Meters from a power line.

III. 34. *“...current part 15 levels will limit the harmful interference potential of Access BPL to relatively short distances around these devices”.*

When a system encompasses an entire community, interference has the potential to be heavy wherever an active repeater device is located, and the interfering signals will be carried along power lines wherever unbalanced impedance discontinuities in the lines cause these to act more as an antenna than as a transmission line.

“All unlicensed devices operating under Part 15 are subject to the condition that they not cause harmful interference and that they cease operation if they do cause such interference”.

What is the definition of harmful interference? Will signal levels which do not exceed Part 15.209 limits but which prohibit weak signal reception by a licensed operator be considered to be harmful? Will such a condition require a cessation of Access BPL operations? If so, what will be the mechanism for notifying the Access BPL service provider, and what will be the time frame allowed for the cessation of operation?

III. 35. *“...many amateurs already orient their antennas to minimize the reception of emissions from nearby electric power lines.”*

This statement is completely inaccurate, and indicates a failure on the part of the Commission to understand the nature of amateur radio operations.

Rotatable high gain, directional antennas are commonly employed at amateur fixed stations. However these antennas are designed to be directed towards the distant amateur station, permitting maximum signal gain over the communications path while minimizing transmitted and received interference on other bearings. And, most importantly, allowing each station involved in the communications to use the minimum transmitter power required to maintain communications *as required by the FCC under the rules governing the Amateur Radio Service*. If the source of interference lies along the desired path, the interference will be increased in like proportion to the gain provided to the distant station, and this ratio will be unaltered on any beam heading. Vertical antennas are omni-directional, and cannot be oriented to minimize noise from a single source. The dimensions and orientation of the property on which the amateur station is located usually dictate the orientation of fixed wire antennas. As the length of many wire antenna designs equal or exceed the size of a typical city lot, installations vary greatly in order to fit within the physical limitations. Most amateurs do not have the luxury of considering the orientation of nearby power lines when choosing a location and orientation for a fixed antenna.

In any case, harmful interference may result from BPL systems, even if the system meets Part 15 emission limitations. This may result in an overall increase in the typical RF power level used by the typical amateur station in order to overcome this new interference source. This possibility is undesirable and in conflict with the spirit of the FCC rules governing the Amateur Service. Also, the higher typical power levels that could come into use are contrary to the need to conserve spectrum within the bands employed by this service.

III. 41. *“Notching of specific frequency is technical feasible.”*

Provision should be made to prohibit Access BPL operation on amateur, public service, government and other critical HF and VHF frequencies, recognizing that these licensed services by their nature deal with

weak signal levels on a regular basis. Special consideration must also be given to public safety operation in fringe reception areas of their communities.

Even operation on these frequencies were not allowed, we do not expect that all BPL-generated interference on those frequencies would be eliminated, due to intermodulation products between the OFDM carriers. Non-linear active devices in the system would likely be a source of such intermodulation products, which would fall within the prohibited bands. However, it is to be expected that these products would be -20 to -40 dB below the level of the fundamental carriers. This would result in an objectionable 30 uV of interference at other frequencies being reduced to between 0.3 and 3 uV, a potentially tolerable situation.

III. 42. *“..we request comment on whether we should have specific requirements regarding the above mitigation approaches.”*

We feel that BPL operators must be required to do a complete proof of performance of their systems at the time of installation, and thereafter on an ongoing basis. BPL operators must be required to correct or turn off portions of their system that they find to be out of compliance, rather than waiting for a complaint from the community. (There is ample precedence for continuous proof of performance measurements in F.C.C. regulations, specifically as required of AM broadcasters that utilize directional antennas - Part 73.154).

Additionally, BPL operators must establish procedures for receiving interference complaints on a local level. Interference problems must be corrected within seven days or operation of the offending portions of the system must cease.

III. 43. *“The Access BPL system operator would submit information on its system to an industry operated entity. would it be more reasonable to allow each Access BPL operator to maintain a database of its own rather than require a more centralized database?”*

BPL operators must maintain “public files” in the community of operation, which shall be made available to any interested member of the general public during regular office hours. These files shall contain complete design specifications and diagrams of their systems, copies of all proof of performance measurements, and copies of all interference complaints and responses. It is important that this data be maintained on a local level rather than as part of a central database, allowing quick and easy access to members of the community, in the interest of the fastest possible interference mitigation. (Precedence exists for the maintenance of Public Files in F.C.C. regulation of the broadcast industry – Part 73.3526, “Local Public Inspection File”.

III. 45. *“We tentatively propose that Access BPL systems ... be measured in-situ to demonstrate compliance with our Part 15 rules, at a minimum of three overhead and three underground representative locations...”*

...and on a regular, ongoing basis thereafter. It should not be the responsibility of community members or the operators of other services to find and report the existence of interference generators. Rather, the operator should be required to be proactive, and to measure, identify and eliminate sources of interference before they become the subject of a public complaint.

CLOSING STATEMENT

In summary, the Western Illinois Amateur Radio Club urges the Commission to proceed carefully with the development and implementation of this important new service. Adequate protection must be provided to all users in licensed services as well as for US Government agencies. Part 15 devices and systems by definition are and must remain subservient to licensed services. Once the interference “genie” is out of the bottle, it will not be possible to put it back.

Respectfully submitted,

THE WESTERN ILLINOIS AMATEUR RADIO CLUB
Quincy, Illinois
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