Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:

Inquiry Regarding Carrier Current Systems, including Broadband over Power Line Systems	**ET Docket 03-104**

To: The Commission

COMMENTS OF RAY SOIFER

Ray Soifer hereby respectfully submits his comments in response to the *Notice of Inquiry*, FCC 03-100, 68 Fed. Reg. 28182, released April 28, 2003 and corrected May 23, 2003 at 68 Fed. Reg. 32720. In response to some of the questions contained in the Notice, Soifer states as follows:

1. I am the holder of an Amateur Extra Class license, with the call sign W2RS, and currently make use of all Commission-authorized amateur bands from 1.8 to 54 MHz, plus 144 and 430 MHz. I have been active in amateur radio since 1955, specializing primarily in weak-signal communication modes, e.g., long-distance (DX) MF/HF ionospheric propagation, satellite, meteor scatter and earth-moon-earth (moonbounce).

2. My primary amateur station is located in my home in Glen Rock, New Jersey, in a neighborhood consisting exclusively of single-family homes on lots of one-quarter to one-half acre. It is served by overhead power, telephone and cable TV lines. Broadband Internet access is available via the cable system (Optimum Online℠), and the cable operator has generally responded promptly to leakage complaints.

3. A recent analysis by Ed Hare, W1RFI, of ARRL, the National Association for Amateur Radio, available on ARRL's Web site, shows that amateur stations such as mine are likely to experience severe interference from the introduction of Broadband over Power Line (BPL) systems, if the Commission's current rules regarding maximum permitted emissions from such systems are maintained[1]. Amateur stations located in more densely-populated environments, e.g., townhouses and apartments, could be even worse affected. Studies conducted in other countries have produced similar findings. Some of these made use of actual in-the-field measurements[2].

4. Hare's analysis, and others I have seen, assumed terrestrial amateur operation only. However, downlink signals from amateur radio satellites are often considerably weaker than typical terrestrial signals, and would be correspondingly more vulnerable to interference from BPL systems. Currently, there are two amateur radio satellites operating with downlinks in the 28-29.7 MHz (10-meter) band: AMSAT-OSCAR 7 and the Russian satellite RS-15. Both employ linear communication transponders capable of relaying many amateur signals simultaneously over thousands of miles. Including these, a total of twelve amateur radio satellites have carried 10-meter downlinks into low or medium earth orbit.

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[1] Ed Hare, W1RFI, *Calculated Impact of PLC on Stations Operating in the Amateur Radio Service*, ARRL, November 15, 2002.

[2] For example, see David Lauder, G0SNO, *EMC*, in the June 2003 issue of RadCom, the monthly journal of the Radio Society of Great Britain.

5. A typical example of how weak such signals are is as follows: The 10-meter downlink of AMSAT-OSCAR 7 currently transmits with a power output of approximately 0.5 W, shared among the stations transmitting through it at any one time, including the satellite's own telemetry beacon. If one such station consumes one-tenth of the total power (a typical case), its power output from the satellite's dipole transmitting antenna would be 50 mW (82 mW eirp). At a distance (slant range) of 3,000 km, again a typical value and far from the maximum range of about 4,000 km dictated by the satellite's orbit, the signal strength into a half-wave dipole receiving antenna would be approximately -110 dBm, or 0.7 microvolts across an input impedance of 50 ohms.

6. At the present emissions limit of 30 microvolts per meter at 30 meters, the same half-wave dipole would see an interfering signal from a BPL system of approximately -75 dBm in a receiving bandwidth of 9 kHz, or approximately -80 dBm in the 3 kHz bandwidth more likely to be employed to receive amateur SSB signals from AMSAT-OSCAR 7. The BPL interference, then, would be approximately 30 dB stronger than the desired signal from the satellite's downlink.

7. In practice, the interference problem is likely to be even more serious. The foregoing analysis assumed that the satellite's transmitting dipole and the receiving dipole on the ground are optimally positioned with respect to each other, that there is no mismatch in polarization, and that there is no ionospheric absorption. In reality, these favorable

conditions rarely occur, so on average, the satellite's downlink signal will be on the order of 5 to 6 dB weaker than the -110 dBm calculated here.

8. It should also be noted that in many suburban residential neighborhoods, to assume a separation distance of 30 meters -- over 98 feet -- between the emitting power line and the amateur station's antenna would be optimistic. In my case they would only be about 40 feet apart, and the BPL interference level correspondingly stronger.

9. Two Russian amateur radio satellites, RS-10/11 and RS-12/13, have also carried communication uplinks in the 21 MHz band. Since their footprints in orbit were roughly circular areas more than 2,000 miles in radius from the sub-satellite point, the cumulative impact of millions of BPL devices would have produced very harmful interference to these uplinks, similar to the ionospheric-propagation case described by Hare. As in that case, this interference would have extended far beyond U.S. national boundaries. No such uplinks are currently functioning in orbit, but RS-10/11 and RS-12/13 produced valuable research into ionospheric propagation through polar regions[3] and additional 21 MHz uplinks are under active consideration by several prospective amateur satellite-building groups.

[3] John Branegan, GM4IHJ, Space Radio Handbook, Radio Society of Great Britain, 1991.

10. In the 50 MHz band, signals even weaker than those discussed above are commonly used by amateurs for meteor-scatter, ionospheric scatter and even earth-moon-earth communication.

11. The potential effect of harmonics of BPL emissions in amateur bands above 144 MHz could be serious as well. My own experience with low-power (37 dBW eirp) earth-moon-earth communication at 144 MHz[4] shows how extremely vulnerable such operations are to ordinary neighborhood interference sources such as incidental radiation from personal computers, leakage from power lines, etc.

12. The BPL industry maintains that no significant interference to licensed services, including amateur, is likely. In view of the facts presented in these comments, I strongly urge the Commission to require full theoretical and field-testing studies of potential interference to the amateur and amateur-satellite services, and possible corrective and preventative measures, and to take these studies into account in determining how BPL is to be regulated. As a licensed service, amateur radio is entitled under the Commission's Rules to protection from any and all harmful interference from Part 15 devices such as these.

Respectfully submitted,

Ray Soifer

[4] Ray Soifer, W2RS, *QRP EME on 144 MHz: How and Why*, Proceedings of the 26th Conference of the Central States VHF Society, ARRL, 1992.

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