

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

In the Matter of )  
Inquiry Regarding Carrier Current )  
Systems, including Broadband over )  
Power Line Systems )

ET Docket No. 03-104

REPLY COMMENTS OF  
GARY W. BOX  
To Comments of  
APPA  
Dated 28 July 2003

These are Reply Comments of Gary W. Box to comments filed by APPA

The writer received a BSEE and MSEE from UCLA, 1977 and has been employed as a electrical engineer involved in the power electronics and industrial electronics industries for 29 years, mainly in product development. This experience includes numerous encounters with FCC emission requirements including designing, building and testing equipment for compliance. The writer has also been issued 9 patents and currently holds the call sign N0JCG as a member of the Amateur Radio Service.

These replies take the form of excerpts from APPA's original comment, noted as "Comment," followed by reply remarks, noted as "Reply". A number annotates each Comment and Reply. Replies commence immediately below.

1. COMMENT

"The Commission should be careful in developing emission limits for BPL. In this regard APPA endorses the comments of the United Power Line Council (UPLC) and the Power Line Communications Association. UPLC reports that there has been no interference reported in many of the field tests of BPL by its members."

REPLY

APPA is apparently not aware of the tests done in Japan, Germany, Austria, England and, most recently, here in the US, all of which show substantial harmful interference from BPL transmissions. APPA has also chosen to subscribe to the UPLC's attitude of "pollute first and see who notices". It is quite easy to conduct tests on how BPL will affect amateur radio, short-wave and other HF radio reception, but they chose instead to proceed with transmissions and wait for interference reports. It should be pointed out that the BPL tests to date in the United States have been over a controlled and very limited geographical area with no parties interested in HF communications invited to participate. The commission should rely on testing with actual receiving and transmitting equipment to determine harmful interference and not rely on interference incident reports.

2. COMMENT

"BPL is a technology that can permit public power electric utilities to provide facilities based, broadband services to rural and underserved communities that presently do not have such service or are served only by a monopoly. Regulations must be flexible enough to accommodate this newly developed technology and the public power utilities that are in the position to employ it."

## REPLY

The UPLC has stated in its comments on this NOI that “Typically the BPL signal travels substantially less than a mile from the point where it is injected”. This makes BPL a poor candidate indeed for delivering broadband Internet to rural areas.

Access BPL is not the only way the utilities can achieve these goals. In fact it is not the most economical, easiest deployed, or reliable of the choices available to the utility. I would like to remind the Commission of their recent work on establishing the Unlicensed National Information Infrastructure band at 5Ghz. The very function of Access BPL is to be part of this infrastructure. It seems only logical that the utilities also use the U-NII band for this purpose. By mounting U-NII nodes on power poles at appropriate intervals (between 1 and 10 miles), All the goals of the Commission, the utilities and even the manufacturers can be achieved without causing interference to any HF users. Perhaps more importantly, U-NII implementations such as the Motorola Canopy system can be deployed immediately, without any further Commission action or cost to the Federal Government. I don't think APPA can find anything more flexible than that.

The advantages of using the U-NII band over BPL are numerous:

1. No interference to any users in HF.
2. No need for frequency notches.
3. No direct connection to power line, other than for power.
4. Independent of powerline noise.
5. Independent of powerline impedance characteristics.
6. Independent of power grid switching
7. Independent of powerline reliability, with battery backup.
8. Independent of powerline routing. Only pole location is important.
9. Freedom to configure the network as desired; either with directional antennas or omnis.
10. No safety concerns.
11. No interference liability for the utility.
12. Cheaper hardware (5Ghz transverter should be cheaper than powerline inductive components).
13. Lower radiated RF power
14. Lower power consumption overall. Could be solar powered
15. System robustness
16. FCC gets its “third wire”.
17. Providing rural service is trivial.
18. Strap-on installation means neighborhoods could be “wired” in hours, not months.
19. Cheaper installation
20. Little or no rule changes needed.
21. Bandwidth is almost four times wider than BPL, leading to higher performance.

## 3. COMMENT

“Further, to the extent that interference is demonstrated, there should be an attempt to accommodate BPL, even if it means that existing communications providers may have to share or transfer bandwidth.”

## REPLY

Of the entire electromagnetic spectrum, from DC to light, only the tiny sliver between 1 and 30 MHz is capable of unassisted, worldwide communication using little power and absolutely no infrastructure. The Amateur Radio Service, short-wave broadcasters and other services demonstrate this fact daily. It is not possible to transfer these services to any other portion of the spectrum and have the same result. Any RF emissions from powerlines using BPL would likewise be transmitted worldwide, by the same physical phenomena.

All BPL equipment providers have indicated they use OFDM modulation. OFDM modulation involves the creation of a large number of carriers, modulating each to transmit the packet, then extinguishing them all. To get the highest bit rate from each of the carriers, the envelope edges of all carriers must be steep. This will cause an impulse excitation to the transmission medium (the entire power line) and will radiate over the entire HF spectrum. Recent tests by the American Radio Relay League (ARRL) using a conventional

mobile amateur radio configuration documented substantial harmful interference from several BPL systems that was characterized by this exact impulse noise. A mode that imposes high levels of impulse noise across the whole HF spectrum is incompatible with the relative narrow bandwidth, high sensitivity modes of all licensed HF spectrum users. Thus sharing is not possible.

When the FCC was established, it was to bring order to the radio spectrum. It has done so by establishing a licensing structure and making rules to protect those services from interference. Unlicensed operation can never be allowed to have priority or even equal footing with licensed services unless they themselves become licensed, which includes a means to identify the source of the transmission. To do otherwise would be to return to the chaos of the spark transmitter. The HF radio spectrum is no place for broadband spread spectrum operation. Since HF services cannot move and still use the ionosphere, I would submit to the FCC that any broadband Internet delivery service using RF energy be either on balanced media or be relegated to a band created for that purpose such as the 5GHz Unlicensed National Information Infrastructure band.

Respectfully Submitted

Gary W. Box