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

In the Matter of	)	
Inquiry Regarding Carrier Current	)	
Systems, including Broadband over	)	ET Docket No. 03-104
Power Line Systems	)	

REPLY COMMENTS OF
GARY W. BOX
To Comments of
Satius Inc.
Dated 14 July 2003

These are Reply Comments of Gary W. Box to comments filed by Satius, Inc.

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 Satius 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
Higher than 200MHz frequencies need to be used to communicate through the distribution transformers with low losses, and matching needs to be used to achieve magnetic waveguide over the mid/low voltage power line through its transformers. Accordingly, Satius proposes the following limitations to Access BPL analog and DSP systems.

FREQUENCY	FIELD STRENGTH	MEASUREMENT DISTANCE
9-490Khz	2,400/F(Khz)	300 meter
0.49-1.705 MHz	24000/F(Khz)	30 meter
1.705-54 MHz	500uV/meter	300meter
54-88 MHz	100 uV/meter	30 meter
88-215 Mhz	150uV/meter	30 meter
218-470 MHz	500uV/meter	300 meter
470-960 MHz	200uV/meter	30 meter
above 960 MHz	500uV/meter	300 meter

REPLY
The proponents of BPL, Satius included, are under the mistaken notion that the Part 15 emission limits are a sort of digital threshold, below which there is no interference and above which there is. Harmful interference is defined as any repeated interruption of a licensed service, regardless of the RF field level from the offending device. Recent tests by the American Radio Relay League (ARRL) using a conventional

mobile amateur radio configuration documented substantial harmful interference from several BPL systems. The field strengths that Satius is proposing will cause interference to Amateur Radio and other users of the various bands at least within the measurement distance, and in most cases far beyond. A typical high frequency radio receiver has a sensitivity of 1uV for a 10dB signal to noise ratio, or better. If we assume a 1 meter dipole, the 500uV/meter field strength in the 1.705-54MHz range would lead to 500uV at the receiver. This is 30dB greater than the minimum signal for that receiver. Since this would be at 300 meters (984 feet), any HF receiver within 1000 feet of a BPL system would be effectively jammed. The majority of the American population lives less than 1000 feet from a power line, so Amateur Radio, short-wave broadcasting, National Bureau of Standards Time Signals, and any other HF service would all be impossible for anyone within the BPL service area.

2. COMMENT
The limits shown in the above table are based on measurements employing an averaging detector.

REPLY
Several vendors have described their BPL systems as a wide band system using OFDM modulation to avoid frequencies in the amateur or other bands. OFDM modulation creates 256 (or more) discrete RF carriers and imposes a separate bit stream on each. The 256 carriers suddenly appear, transmit their bit streams, which form the packet, and then are extinguished. The actual packet density will depend on the system load. If the leading and trailing edges of these carriers are fast, the edge of each packet will look like an impulse excitation to the power line. The spectrum of an impulse is spread infinitely across the spectrum. The power line obediently reacts to this excitation as the distributed, unbalanced, resonate wire structure it is and an impulse of energy is radiated all across the HF spectrum. The phenomena would occur at every edge of every packet. In a lightly loaded system, where most of the activity is “pinging” the packets are very short, however each and every one will cause wideband impulse noise. In such an instance, a spectrum analyzer using an averaging detector will measure a very low average. An HF radio, however, will act as a peak detecting detector and will respond to each of the impulse.

On the HF band, the development emphasis over the last 100 years has been on raising signal to noise performance by designing ever-sharper filters and highly bandwidth conserving modulation schemes, a mode that continually generates impulse noise over the whole band like OFDM is incompatible.

With this, and other comments, Satius makes it clear that they are seeking to have the Commission impose the highest possible RF emission limits on BPL technology. They are thus admitting that the power line is a poor conductor of RF and they need to increase the radiated energy level as high as possible to get sufficient performance. The conducted limits were set after significant study by the FCC and the power distribution system will react the same to RF energy whether it is from noise or intentional BPL injection. By raising the conducted limits the commission would be throwing out almost 20 years of progress in suppressing unintentional HF RF emissions.

Respectfully Submitted;

Gary W. Box