

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:)
)
Inquiry Regarding Carrier Current Systems,)
Including Broadband Over Power Line) ET Docket 03-104
Systems)

**REPLY TO THE COMMENTS OF
THE ALIANCE FOR PUBLIC TECHNOLOGY
(DOCUMENT # 6514284392)**

August 19, 2003

The Pisgah Astronomical Research Institute (PARI) is pleased to reply to comments filed regarding Broadband over Power-line Technology submitted by the Alliance for Public Technology (APT). PARI is a not-for-profit organization providing a radio and optical astronomy research facility to educational organizations such as schools and universities throughout the southeast.

While PARI believes that the intentions of the Commission are fully directed toward the growth of broadband services resulting in more choices to consumers, PARI must take exception to the beliefs that BPL is a premium opportunity to achieve these goals. PARI agrees with APT's self assessment that they are not in a position to comment on technical questions raised in the Notice, however, technical, engineering, and physics issues cannot be ignored or overlooked, regardless of best intentions to bring advanced services and applications to Americans. To do otherwise is simply irresponsible, and a waste of those very American's tax dollars.

PARI commends the APT on their efforts now embodied in Section 706 of the 1996 Act, however PARI will have to fundamentally disagree with the aggressiveness promoted in achieving these ends, with blatant disregard to technical issues and near certain impact to existing systems and services.

PARI strongly disputes the APT assertion that Broadband over Power-Line has the potential to become a strong facilities based provider in the

developing broad band marketplace, and rather is poised for disruption to existing services and facilities for the following reasons:

- 1. Digital signals, however conveyed, are inherently difficult to restrict to their basic modulation bandwidths (in this case 2 to 80 MHz) and will cause harmful interference to services occupying the harmonic multiples of this range. We have often seen 5 MHz digital signals generate receivable energy well beyond 10 GHz via these harmonics. Low manufacturing cost targets are juxtaposed to the application of adequate filtering to control this problem.**
- 2. Coupling of BPL signals to uncontrolled impedance unshielded lines is in effect giving them an antenna. The effectiveness of this antenna is proportional to its length in wavelengths. Most typical power lines will provide multiple wavelength efficient radiators of this energy. In fact power lines will prove to be a lossy medium to convey the desired signal to its intended destination because of this radiation.**
- 3. These frequencies by nature are “International” in that very low power (milliwatts) can facilitate communications worldwide. By radiating in this range the BPL providers will become the targets of worldwide interference complaints. But being a non-licensed service, it is not readily traceable, except to the nation of origin. Japan has withdrawn their interest in this technology after realizing its potential for interference both locally and globally.**
- 4. This technology while functional in limited tests, in our experience, will not “scale well”. That means the deleterious effects will grow exponentially with broad deployment. Large areas will in effect become more efficient phased array radiators of this noise.**
- 5. Due to the efficiency of the power lines as antennas at these frequencies, reciprocity says they will also couple or receive existing services’ RF power into the receivers of the BPL signals efficiently as well, in all likelihood rendering them inoperative. This will cause licensed users of this spectrum to become the targets of interference complaints from unlicensed and less technically competent users.**
- 6. It has been our personal experience that power utilities have a horrific record at correcting interference even from corona from damaged utility hardware at 60Hz. It is logical to assume, that when this interference problem covers millions of existing services’ frequencies, the FCC’s challenges at enforcement will be unbelievable. And the power companies are ill equipped to monitor radio frequency interference.**

7. The likelihood of harmful interference to wide swaths of frequencies well above the intended 2-80 MHz is a certainty. My engineering experience has been that anywhere corrosion exists, a frequency doubling and tripling effect occurs in the signals. This includes sensitive Aviation frequencies in the 108-130 MHz range that use AM as their com mode. This mode is very noise sensitive. Cable system leakage is already a hazard in this range, and this is from a shielded system. BPL is totally unshielded. An aircraft at 30,000 feet sees an area of at least 50 miles radius. Com and Nav frequencies can ill afford interruptions of service caused by leakage from BPL. A single downed aircraft linked to interference from a power system would likely generate hundreds of Millions of dollars in wrongful death lawsuits.

8. PARI works in one of the most sensitive technology areas: radio astronomy. Signal levels from galactic and extra-galactic physical processes being studied here and at observatories around the world are routinely in the -200 dBm signal level. BPL studies show signal levels for interference in the protected radio astronomy assignments could reach 100 dB above this, making billions of dollars of research equipment worthless overnight.

While APT encourages the Commission to take action to bolster broadband competition, PARI encourages the Commission to take the opportunity to employ sound engineering practices (as is currently done by the Commission with similar radiated and conducted susceptability measurements) for the long term good of the American people. This should include maintaining Part 15 limits at current levels or below.

PARI agrees with APT that the Commission should regulate in a neutral manner, however, this should not preclude proper engineering assessment, consideration to shielding, and emission limits. It is our recommendation as engineers, experienced radio frequency designers, radio astronomers, scientists, and users of equipment for this spectrum, that the BPL technology is wholly inappropriate for the scope and breadth of application being suggested in this case.

Respectfully submitted,

Charles S. Osborne
Technical Director
Pisgah Astronomical Research Institute
1 PARI Drive
Rosman, NC 28772