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

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

To: The Commission

Reply Comments of the Society of Broadcast Engineers, Inc.

The Society of Broadcast Engineers, Incorporated (SBE), the national association of broadcast engineers and technical communications professionals, with more than 5,000 members world wide, hereby respectfully submits its reply comments in the above-captioned notice of proposed rulemaking (NPRM) relating to broadband signals over power lines (BPL).

I. Proposal Will Cause Interference To Existing Users

1. SBE agrees with the comments filed by the American Radio Relay League (ARRL): Although the goal of using broadband signals over power lines to provide expanded Internet access to a wider population is a commendable goal, it cannot justify causing interference to stations now operating on medium wave, HF, and VHF low band frequencies. ARRL is exactly correct when it stated:

> [The Commission] is affirmatively obligated, however, to ensure that a potential technology's drawbacks (in terms of compatibility with existing services which themselves provide strong, often essential, public interest benefits) do not outweigh the perceived competitive benefit of the technology under consideration. With respect to BPL, the Commission is proceeding headlong toward authorizing a technology which, even in limited test deployment, has been shown to create significant, harmful interference to fixed and mobile Amateur radio stations near overhead power lines. That interference, in many cases, has proven not to be subject to resolution.

2. SBE shares the expressed ARRL concern that "...all indications are that the Commission simply does not want to hear the bad news, only the good, about BPL." This suggests that wishful thinking policy considerations are attempting to trump common sense and good engineering practice at the FCC; SBE hopes that is not the case in this rulemaking.

3. SBE also agrees with ARRL that Part 15 Rules drafted to deal with intentional point-source radiators are inappropriate for distributive systems such as BPL. SBE agrees with the ARRL comment:

> 19. A major issue in the analysis of interference from BPL to geographically proximate Amateur radio stations is the extent to which BPL signals radiate from the power lines. That is, whether or not the systems radiate as point source radiators or as distributive systems, i.e., line source radiators. BPL proponents in the Docket 03-104 Inquiry portion of this proceeding suggest without technical analysis that Access BPL operates as would a point-source radiator. Indeed, BPL proponents are boxed into this argument, because the Part 15 radiated emission levels are premised on point-source radiators and not distributive systems. To concede that Access BPL is a line-source radiating system would be to concede the inappropriateness of the current Part 15 radiated emission levels.

4. And it is not just SBE and ARRL that believe that BPL would act as a line-source radiator. The comments of the Institute of Electrical & Electronic Engineers (IEEE) warn the Commission of this reality[1], as do the comments of BellSouth Corporation[2], and the comments of the Disaster Emergency Response Association (DERA)[3].

5. One BPL provider, Current Technologies LLC, filed comments claiming that BPL will only act as a "few" point source radiators, and that BPL will not create a "city-sized antenna." SBE finds it ironic that Figure 1 to the Current Technologies comments shows just the opposite: Namely, it shows that measured field strengths from a prototype BPL system radiates only 10 dB less than the "entire line radiates" case. Had Current Technologies been able to demonstrate 40 to 50 dB less radiation, its Figure 1 would support its claim. But only a 10 dB differential, in SBE's view, supports the ARRL, BellSouth, DERA and IEEE claims that power lines carrying BPL signals in the 1 to 80 MHz range will act as giant antennas.

6. Nor does the Current Technologies' suggestion that "if additional protection were needed, it would come from the growing practice of burying power lines" offer a practical solution.

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1 IEEE comments, at Paragraph 10.
2 BellSouth comments, at Page 5.
3 DERA comments, at Pages 2-3 and at Page 7.

Undergrounding of power lines generally only applies to new construction. SBE believes that it would be impractical to underground existing overhead power lines, and clearly the vast majority of power lines are overhead, not underground.[4]

7. If there is any doubt that broadband signals in the 1 to 80 MHz range would radiate when coupled into overhead power lines, all the Commission has to do is look at the experience with cable television system once those systems started to use mid-band (108–174 MHz) and hyper-band (216–550 MHz) spectrum to carry additional channels. Even though cable systems use shielded coaxial cables, leakage quickly becomes an interference problem to services authorized to use those very same frequencies. As a result, the Commission had to create an extensive set of Cumulative Leakage Index (CLI) rules[5] to ensure that interference is not caused to over-the-air users of these frequencies, and all cable systems using the mid-band and hyper-band channels are required to monitor their leakage levels on an on-going basis. If cable systems using high-quality, shielded coaxial cables to distribute their signals nevertheless have a leakage problem, think what the leakage will be like if broadband signals are intentionally coupled into un-shielded, non-twisted pair power lines.

8. The comments of BellSouth also noted the cable leakage parallel, and cautioned that:

> Service entrances are installed, feeder networks are upgraded, and other changes are made to improve the distribution of electrical power. Each of these modifications changes the impedance of the network at BPL frequencies and consequently changes the environment in which the proposed BPL system would operate. As a result, any of these changes provides a new opportunity for interference to other services.

SBE agrees with these BellSouth comments. If BPL is nevertheless allowed, a stringent requirement for rigorous and ongoing monitoring of radio frequency interference (RFI) from power lines carrying a broadband signal would be imperative.

9. SBE again agrees with ARRL that the adoption of the proposed Part 15 BPL rules would get things exactly backwards: Part 15 devices/uses should only be authorized if there is a reasonable expectation that no interference to licensed services would be created in the first place, and not on the assumption that the Part 15 use will cause interference to licensed services, but

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[4] According to the Utility and Power Automation web site, almost 80% of the power grid in the U.S. has been built with overhead power lines. See http://uaelp.pennnet.com/Articles /Article_Display.cfm?Section=CURRI&ARTICLE_ID=201816&VERSION_NUM=1&p=34.

[5] See Sections 76.610 through 76.619 of the FCC Rules.

when that interference occurs the Part 15 user must then implement certain mandatory mitigation measures.

10. SBE has little confidence that even if all of the proposed mitigation measures are adopted that they would be effective. It is unrealistic to expect that a BPL provider would lower the level of its BPL signal, let alone shut off the BPL signal, upon receipt of an interference complaint. Indeed, the comments of Current Technologies indicates that it would ignore complaints it deemed "frivolous," and it opposes making any database of BPL providers, locations and frequencies available to the public. SBE again agrees with ARRL:

> The strong incentive, in fact, would be to stonewall, as the BPL advocates have done thus far, and to simply deny that there is any interference potential at all from BPL systems. When confronted with the inevitable interference complaints with respect to deployed systems, they would have a "strong incentive" to merely write off the complaints as "unsupported," as Commissioner Adelstein has apparently done, or else to deny that the interference is "harmful" and therefore the BPL system has no obligation to remedy it.

11. Then there are the comments of Consolidated Edison Company, which want the proposed "cease operation if causing harmful interference" rule watered down to a version that would first allow a BPL provider to try an unlimited number of attempted mitigation measures with no time limit on their duration. Only a clear "shut down on interference" rule would have any hope of achieving the intended goal, that of ensuring that a Part 15 use not cause interference to a licensed user.

12. Not having a clear and unambiguous shut-down-on-interference-to-a-licensed service requirement for Part 15 BPL would establish a very bad precedent. Broadcasters already have a chronic interference problem from Part 15 wireless local area networks (WLANs) operating at 2,400–2,483.5 MHz, which is co-channel with TV Broadcast Auxiliary Service (BAS) Channels A8 (2,450–2,467 MHz) and A9 (2,467–2,483.5 MHz), and sometimes there is difficulty convincing the secondary Part 15 user to shut down, so as to stop interfering with a licensed service (namely, Part 74, Subpart F TV BAS). SBE does not want to see 2.4 GHz Part 15 users pointing to a watered-down "shut down eventually" provision for Part 15 BPL, and claiming that they should have a similar entitlement.

13. Consolidated Edison Company further argues that the proposed "shut down upon interference" rule would be too draconian, and might result in a threat to the power grid itself, if BPL is being used for power grid monitoring functions. But, any function of critical importance

(or, Mission Essential Voluntary Assets, or "MEVA," as Consolidated Edison puts it) should *never* use a secondary, non-protected, bottom-of-the-RF-food chain Part 15 application. There are many other means of controlling or monitoring a power grid that use licensed, and therefore protected, frequencies, or dedicated cables.

II. BPL Would Destroy VHF Low Band DTV

14. SBE agrees with the comments of the Association for Maximum Service Television, Inc. (MSTV) that if BPL is allowed use of spectrum between 50 and 80 MHz, it will have a devastating impact on the viability of VHF low band DTV. The VHF low band DTV threshold is defined as a signal level of just 28 dBu, or 25.1 μV/meter. This is 19 dB weaker than the 47 dBu signal level defining Grade B signal strength for VHF low band NTSC operation. SBE cannot think of a better way of ensuring that VHF low band DTV will never work than allowing BPL with spectrum up to 80 MHz. Indeed, even limiting BPL to a maximum of 50 MHz might not be sufficient, because of the likely generation of harmonics and the difficulty of enforcing a 50 MHz upper spectrum limit on tens of thousands of Part 15 BPL devices.

III. Impact to BAS

15. BPL has the real potential to cause harmful interference to Subpart D Remote Pickup (RPU) BAS stations operating on any of the twenty-six HF RPU channels between 25.85 and 26.48 MHz, and to Subpart H Low Power Auxiliary (LPA) stations operating on any of the nineteen HF LPA channels between 26.10 and 26.48 MHz. The LPA channels are heavily used in California by broadcasters for interrupted fold back (IFB) from their electronic news gathering (ENG) trucks to their reporters in the field, and the RPU channels are used for backup communications when 450 MHz RPU frequencies do not work or are busy. There are hundreds of LPA IFB systems, manufactured by Comrex Corporation, installed in ENG and satellite trucks. These channels are used in many other markets, including many medium sized markets all the way to other major markets, for cues and orders related to radio and television remote broadcasts. The attached Figure 1 provides an example of this readily available, in-use, 26 MHz BAS LPA hardware.

IV. Impact to EAS

16. BPL could potentially cause harmful interference to Emergency Alert System (EAS) warnings transmitted by broadcast stations. Standard (AM) broadcast stations between 1,000 kHz and 1,700 kHz would be especially at risk. BPL interference to the reception of AM broadcast signals could degrade the EAS in multiple ways, as follows:

17. National level EAS messages, where the President must utilize the EAS to address the country, utilize what are know as Primary Entry Point (PEP) AM broadcast stations scattered around the country. The role of these AM broadcast stations is to distribute the vital presidential message to the Local Primary (LP) stations in virtually every portion of the United States. The PEP-to-LP link is critical to the mission of our national EAS communications structure.

18. Once the presidential message is received by the LP station, many of which are AM broadcast stations, it is the role of these stations, located in virtually every market of the country, to the President's message to the local radio and TV stations, and local cable TV systems, within those areas.

19. In the case of state or local area emergencies, the EAS is called upon to distribute and broadcast life-saving emergency messages to our citizens. Once again the LP stations are called upon to perform the critical function of relaying emergency information to the other broadcast stations and cable systems within that state or local area.

20. It is well known that amplitude modulation (AM) transmissions is subject to interference from natural as well as man made sources. In many cases the EAS operates in spite of existing noise and interference levels. Any intentional or preventable sources of interference to the reception of AM broadcast signals will seriously compromise the ability of the President to address the country in time of national emergency as well as the reception of other life saving emergency messages and information at the state and/or local level; these include AMBER alerts, which could similarly be impacted.

21. To suggest that Part 15 devices should be permitted to cause emissions that would in any way compromise the ability of the EAS is frightening. If U.S. citizens, in this day and age of terrorism and historic levels of fear about homeland security, were to learn that the ability of EAS was about to be compromised, SBE believes that a widespread level of shock, fear, and anger by the public would result.

22. The threat to EAS would not be limited just to degraded or lost reception of EAS traffic transmitted by AM broadcast stations. The current Federal Emergency Management Agency (FEMA) emergency backup and operational coordination radio system for the EAS Primary Entry Point (PEP) EAS stations uses frequencies between 2 and 20 MHz, depending on band conditions.

23. Low band land mobile VHF (30–50 MHz) is relied on in many parts of the county to relay EAS warnings from local government to broadcasters. For example, 39.48 MHz is used for this critical application in Los Angeles County, and the State of Illinois uses 44.43 MHz for their state-wide EAS message delivery.

V. Impact to Radio Astronomy

24. SBE was surprised to learn, from the comments of the National Academy of Sciences' Committee on Radio Frequencies (NASCRF), that radio astronomy uses frequencies in the HF and VHF ranges; namely, 13.36–13.41 MHz, 25.55–25.67 MHz, 37.50–38.25 MHz and 73.0–74.6 MHz. SBE agrees that radio astronomy work at these frequencies would be impacted (perhaps devastated) by BPL. Although NASCRF requests that these frequencies be "notched out" should BPL be authorized, SBE questions whether such "notching" would be reliable, or effective.

VI. Impact to Maritime Safety

25. The previously cited DERA comments note that HF calling and distress maritime frequencies of 2,182 kHz, 4,125 kHz, 6,215 kHz, 8,291 kHz, 12.29 MHz and 16.42 MHz would all be placed at risk of interference from BPL. Not only would this represent a Part 15 service causing interference to a licensed radio service, it would be interference to a safety service.

VII. Summary

26. No one, and especially not Part 15 users, should be given permission to interfere with licensed services. Allowing data signals extending up to 80 MHz to be coupled into the existing grid of mostly overhead power lines would be an interference train wreck waiting to happen. Such a system would cause chronic interference to licensed users of that same spectrum, and there is no credible engineering basis to indicate otherwise. This was the fatal defect of the RM-10836 proposal,[6] and is also the fatal defect of BPL. BPL is a fundamentally flawed proposal that should not be adopted.

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[6] "Amendment of Parts 2 and 90 of the Commission's Rules to Provide for an Emergency Vehicle Signaling Service (EVSS)." This Petition for Rulemaking by ADiCorp proposed to equip emergency vehicles with all-AM channels/all-FM channels transmitters that would broadcast a warning message (in English only) that an emergency vehicle was approaching. The premise was that the EVSS signal would "override" the signals of licensed AM and FM broadcast stations being received by car radios in the immediate vicinity of the emergency vehicle. However, SBE believed (and so commented) that all EVSS would accomplish would be to interfere, or "jam," the signals of radio stations, and that such interference would not be limited to car radios. On April 19, 2004, ADiCorp asked the Commission to "suspend, or, in the alternative, dismiss without prejudice" its Petition for Rulemanking. While RM-10836 involved a proposal to create a

List of Figures

27. The following figures or exhibits have been prepared as a part of these ET Docket 04-37 reply comments:

1. Example of 26 MHz LPA radio used for IFB and cueing.

Respectfully submitted,

Society of Broadcast Engineers, Inc.

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SBE President

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June 1, 2004

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new, licensed radio service, whereas ET Docket 04-37 proposes a new unlicensed Part 15 use of radio frequency energy, the proposals are alike in that they both would result in harmful interference to licensed radio services.

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Cue Equipment

Features

- **Broadcast Quality Audio**
- **100% Duty Cycle**
- **FCC Type Accepted**
- **Crystal Control**
- **FM**

CTA/LPQRA Cue System

The Comrex Cue System relays both program and instructions from a transmitter (which can be installed in a van, press box, stadium, etc.) to pocket receivers. The CTA Cue Transmitter is a 1 watt rack mount transmitter that accepts two audio sources (program & cue) and combines these sources so that cues automatically override the program, with program remaining audible at a lower level. The LPQRA receiver has 6 KHz audio response for accurate program monitoring, ceramic filters for interference-free operation and high level output for intelligibility in noisy environments. It comes with a sturdy leather belt pouch and headphone.

About Cue Systems

Comrex Cue Systems were originally developed for use as wireless IFB systems for studio floormen. When ENG, EFP and SNG took broadcasting to the field, the CTA/LPQRA system found its way into hundreds of remote trucks as well. Stations who use the Cue System say they really like being able to pull up to a remote and move quickly out of the truck without losing communications from the studio or having to be wired to their intercom system. Whether instructions are carried over 2-way radio, TV aural subcarrier, cellular telephone or satellite, it makes sense to receive this source in the remote truck where reception is strongest (or in some cases, the only place possible) and then repeat it to the field crew.

The CTA/LPQRA system is perfect for this job. With a full watt at 26 MHz, it has sufficient range to cover just about any story. (For instance, it has been used to cover many golf tournaments and to handle cues throughout the Astrodome in Houston.) In addition, this frequency band is available to licensed broadcasters for use anywhere in the United States, so SNG trucks are not geographically leashed to the station's operating area.

The system provides 100 Hz to 6000 Hz audio response so the crew can monitor the actual audio quality

of the program. Comrex cue receivers are designed with careful attention to bandwidth and capture ratio to assure high performance under noisy field conditions. These receivers run for over 20 hours on a 9V alkaline battery. They are rugged, portable and work at 100% duty cycle.

CTA Specifications

Frequency Range: 26.1 - 26.48 MHz
Power Output: 1 watt
Connectors
Antenna: UHF
Cue & Program: Female 3-Pin XLR
Input Levels: -10 dBm (150 ohms) balanced
Power:120 VAC, 50/60 Hz (240 VAC optional)
Size
19" (W) x 5" (D) x 1.75" (H)
47.5cm (W) x 12.5cm (D) x 4.4cm (H)
Antenna External 50 ohm (not provided)
FCC Type Accepted under Part 74 Subpart H

LPQRA Specifications

Frequency Range: 26.1 - 26.48 MHz
Audio Output: 500 mW into 8 ohms
Antenna: Headphone cable
Battery: (1) 9V Alkaline
Size
3" (W) x 1" (D) x 5" (H)
7.5 cm (W) x 2.5cm (D) x 12.5cm (H)