

## **Background:**

I appreciate the opportunity to respond to the FCC's NPRM 03-104 for Broadband over Powerlines (BPL). I would like to first describe my background to provide the commission with a backdrop for understanding my point of view and position regarding the topic of BPL. I am a graduate of the University of Wyoming with a degree in Computer Science. I have ten years experience working with high-end distributed computing infrastructure. I am also an amateur radio operator with a devout interest in RF ranging from high-frequency to microwave communications. I hope to one day extend my background in amateur radio to a career in wireless communication. I also wish to one day retire and enjoy years of experimentation with amateur radio operation, specifically, the unique attributes of the high frequency spectrum, and the ability to communicate world-wide with low power and modest, simple hardware.

As someone who works in the technology industry, I understand the value in bridging the digital divide and appreciate the commission's desires to further extend broadband. However, I believe BPL is not the right solution due to its severe interference potential when other solutions such as WiMax, FTTH, and DSL are more practical, less harmful, and promise a greater return on investment long-term.

The following are my comments regarding the BPL NPRM.

**1. On page 11 under item 26** the commission reference's Ambient Corporation's frequency agile characteristics using OFDM. Ambient states that if a sub-band is being used, the BPL transmitter will "notch out" the spectrum and avoid interference with the licensed user.

This interference avoidance concept is fundamentally flawed because it does not protect the listener, only the user that wishes to transmit at a particular time. Many users of the spectrum spend more time listening than they do transmitting. The commission should not consider this as acceptable interference avoidance capability. It only benefits the BPL provider.

**2. On page 14 under section 31** the commission proposes to maintain existing part 15 rules for BPL and also suggests that BPL devices deploy adaptive interference techniques.

Such techniques (again flawed) would not protect listeners who are looking for distant or weak signals. Many stations communicate using low power. Ionospheric conditions vary depending on many factors, which also affect HF signal levels. Therefore, signals are many times near the noise level and thus would not be loud enough to be heard above BPL signals.

The NTIA study suggests that aggregation of BPL interference is indeed happening. From the NTIA study, "Part 15 specifies that the aggregate emissions from a composite

system must satisfy the field strength limits applicable for a single device. As BPL networks are substantially deployed in a community, the aggregated BPL emissions for the overall network are expected to increase above the levels generated by a single BPL device. This aggregation has already been observed by NTIA at one of the trial BPL systems where multiple simultaneous transmissions occur."

I suggest insufficient study has been done to determine whether aggregation affects are harmful to users, and that the FCC should proceed only after adequate study.

**3. On page 14 under section 31** the commission proposes to have BPL providers maintain a database installation of locations and technical information so that primary users could take action should interference occur.

The burden of interference prevention should rest on the provider, not the licensed user. The commission's suggestion that unlicensed users are allowed to interfere, and that licensed users police their own spectrum and take their own action directly with the provider is unprecedented and unreasonable. In affect, the BPL providers would be the primary users of the spectrum. Further, the FCC offers no detail as to how a transmitter would be identified, what steps the provider should take to make the service information available, how current that information must be, or how the user would identify and locate the provider. The FCC also does not state any punitive actions that may occur to providers who fail to meet whatever obligation defined.

**4. On page 15 under section 33, the commission states that it understands it should proceed cautiously regarding BPL due to the number of interference concerns.**

Comments: The concern is appreciated. I have read the NTIA's study on BPL and it concludes that the FCC may have underestimated the interference potential of BPL given its highly unique transmission patterns. Typical part 15 devices do not normally transmit over unshielded powerlines that are high above average terrain and not nearly as large in structure. Part 15 devices usually do not pose a risk of aggregation. The NTIA concludes there is much greater interference potential to fixed stations, mobile stations, and especially aeronautical mobile stations, than the BPL providers are suggesting. NTIA also recommends the FCC adopt a more stringent emission measurement standard specifically for BPL. I believe the FCC will find emissions are much greater than anticipated, and that the FCC should adopt the NTIA's recommendation.

Also, many trial areas are currently experiencing high interference levels and licensed users have made complaints to the FCC. This is field evidence that emissions are more prevalent than the BPL providers and FCC have previously acknowledged.

I am also concerned that interference could occur over sky-wave / ionospheric propagation from frequency ranges 1 – 50 MHz. I personally have made contacts with international stations that were running less than 5 watts of power. Massive overhead powerline structures that are unshielded will indeed radiate based on laws of physics. Emissions may aggregate and raise the ambient noise level to a level where harmful

interference is prevalent for primary users world-wide. This affect would be extremely hard to reverse and it would deplete a tremendously valuable and rare natural resource. The commission should yield to further study of aggregate and skywave interference potential before finalizing rules for BPL. Part 2 of the NTIA study is focused on this area and will likely shed light on the true potential. As a licensed user, I am very concerned that harmful interference will result.

**5. On page 15 under section 33, the commission states that on balance it believes the benefits of BPL outweigh the potential for increased harmful interference that may arise.**

This is an outrageous comment. The commission's primary job is to protect the radio spectrum. This comment is a radical departure from the commission's previous posture of protection to licensed users. The commission should not willingly allow interference. Secondly, the HF radio spectrum is a unique and natural resource. World-wide communication is possible using low-power and modest hardware. To deplete such a resource would be a tragedy to mankind. A decision to allow HF interference would affect radio signals worldwide and thus cause irreversible damage to licensed users world-wide. This may be in violation of International agreements and/or law.

**6. On page 15 under section 34, the commission states it believes the current part 15 rules will protect licensed users, as they do today for other devices.**

I respectfully point out that BPL's emission capability is vastly unique in comparison to other part 15 emitters. BPL transmissions occur over unshielded power lines that are well above the average terrain level. Unshielded power lines are long and at the HF frequency range serve as excellent radiators. This makes signals especially likely to propagate over ground and in some cases over sky-wave. The commission should impose stricter regulations on BPL providers.

**7. On page 15-16 under section 35, the commission suggests that in practice amateur radio users currently orient their antennas away from electric powerlines, and that BPL would thus not require further action by the end-user.**

The commission does not seem to understand the levels of emissions radiating from BPL power lines and their affect on high-gain antennas. Amateur operators who live near power lines would likely undergo tremendous interference despite antenna orientation. Many amateurs also have no flexibility in orientation due to deed restrictions or antenna type (such as omnidirectional).

**8. On page 16 under section 36, the commission states that the primary source of emissions will be the individual couplers, repeaters, and other devices and to a lesser extend the adjacent power line.**

The NTIA study found the opposite and that emission levels varied depending on a number of factors such as impedance at the source and length between repeaters.

**9. On page 16 under section 37**, the commission states it believes the BPL affects on emergency services will be low.

How does the commission arrive at that conclusion without substantive technical information? The NTIA study suggests otherwise and the need for further study. I personally believe, based on information read and viewed, that licensed services (including emergency operations) will be seriously impacted.

**10. On page 17-18 under sections 40 and 41**, the commission states that it may require providers to include interference mitigation capabilities in their systems and that the commission believes this would be sufficient for avoiding harmful interference.

Current trial deployments of the technology have shown the providers are unable to mitigate interference using suggested technology. In fact, some have claimed they have done all they can when the user is still experiencing harmful interference. Some have only been able to attenuate signals so they aren't "as loud", but the user still is receiving harmful interference. I do not believe technology exists as the commission believes.

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**12. Lack of regard for mobile, maritime, and aeronautical mobile stations**

The commission's NPRM seems only to consider BPL's impact to fixed stations. It offers no protection to mobile users that may enter in an out of BPL areas, that may fly overhead, or that may be seaside parallel to BPL environments. These situations have not been accounted for and would likely yield harmful interference to users.

## **Conclusion**

In conclusion, I'm disappointed with the level of due diligence the commission has provided regarding BPL. BPL technology failed quickly overseas for the same concerns raised currently in our own country. The laws of physics have not changed, and despite BPL provider claims that their technology does not interfere and that they can mitigate the interference, they have not been able to meet their claims when interference complaints have indeed been made. The technology is clearly harmful.

Secondly, BPL is an expensive and risky investment offering little long-term gain when compared to other wireless, shielded copper, and fiber-optic solutions. By advocating

BPL, the commission will only create litigation, a loss of investor money, and will delay the rollout of more practical infrastructure suitable for furthering economic advancement.

Thirdly, the commission and BPL providers have claimed the technology will bridge the digital divide by bringing broadband to rural areas. I suggest it is not economically viable to deliver broadband to rural areas given the expensive cost of infrastructure. BPL providers are focusing on areas densely populated that already have broadband alternatives. Thus, BPL offers little value proposition relative to alternatives.

I believe the commission should set new measurement guidelines for BPL emissions given their unique capability. I believe the commission should require complete notching functionality (not just minor attenuation) for users who are impacted. I believe the commission should yield to previous studies provided by the ARRL and the NTIA that suggest harmful interference is likely or is possible. I am in complete support of the ARRL. The commission should realize the implication of allowing any level of interference by part 15 devices to licensed users. It would be a dangerous precedent to set. Lastly, the commission should be more responsible in protecting consumer money from bogus technological provider claims.

Respectfully,

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