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Comments on Broadband Over Powerline *Notice of Inquiry* ET Docket No. 03-104

The prospect of a widely-available "last mile" broadband interconnect technology is an attractive idea for the FCC to consider. The general public would benefit from an easy-to-access, pervasive broadband Internet connection. However, the idea of broadband transmission via power line has a very high risk of creating unmanageable interference to existing licensed users of the radio spectrum.

As noted in the Notice of Inquiry, authorized users of the radio spectrum in question include fixed, land mobile, aeronautical mobile, maritime mobile, radiolocation, broadcast TV/radio and amateur radio. The FCC has the responsibility to implement regulations that protect these existing licensed users of the radio spectrum. All of these licensed users are important but as a licensed amateur radio operator, I am particularly concerned about harmful interference to the Amateur Radio Service.

The public service benefits of the Amateur Radio Service are well documented. The Amateur Radio Service represents a large pool of trained radio communicators that operate without cost to government agencies. For example, last summer the Hayman Fire, the largest wild fire in the recorded history of Colorado, wiped out over 100,000 acres of forest. Volunteer amateur radio operators (via the Amateur Radio Emergency Service, a function of the American Radio Relay League, <http://www.arrl.org>) provided a key communication support role for governmental agencies such as local fire and sheriff departments. Also served were volunteer organizations including the Salvation Army and the American Red Cross which in turn provided support for families and individuals displaced by the fire.

Part 15 Rules (and any rules relating to unlicensed radio operation) must be crafted very carefully. The end user is the consumer, who is not generally familiar with the technical aspects of wireless technology. Unlike licensed users, consumers are difficult to locate or contact to resolve any radio interference issues. Even when located, the end user often does not perceive that they have a radio transmitter since they view the device as a turn-key appliance. Consumers also do not understand the need to correct an interference problem, often thinking that any product offered for sale is free of problems. The FCC must adopt emission regulations that inherently prevent interference problems by design (and not by remedial action after a problem exists.) Broadband Power Line (BPL) technology has the potential of being deployed widely across the country, which implies that correcting regulatory problems after deployment will be difficult. That is, *the regulations for BPL must be carefully crafted in advance of any deployment.*

The existing Part 15 legal limit of 30 $\mu\text{V}/\text{meter}$ at 30 meters allows for very strong signals to be produced, which are known to cause problems for amateur radio operators. A 30 $\mu\text{V}/\text{meter}$ signal produces a received signal of 338 μV at a 50-ohm 3.5 MHz receiver equipped with a half-wave dipole antenna [Ed Hare, "Calculated Impact of PLC on Stations Operating in the Amateur Radio Service", American Radio Relay League white paper]. This is a very large signal considered that amateur radio operation routinely depends on signals as small as a few μVs .

Part 15 devices already interfere with amateur radio communications (and probably other licensed users). We can expect that if existing Part 15 levels are applied broadly to the power grid, the number of interference incidents will increase. The power grid represents a large, uncontrolled antenna array, capable of radiating in unpredictable ways. It may be tempting to believe that interference from In-House BPL will only occur to the members of the immediate household. However, even the 30 $\mu\text{V}/\text{meter}$ distance of 30 meters can transcend multiple apartments and single-family homes.

Existing powerline communication systems tend to be blocked by the power transformers in the power grid, thereby naturally limited the interference from these RF sources. However, when Access BPL systems are deployed, the power transformers must be bridged to allow signals to pass easily. This will tend to increase interference from In-House systems as well.

The potential for increased harmful interference from unlicensed devices means that the existing emission limits for Part 15 devices should not be increased.

Interference from power lines is a problem that many amateur radio operators have encountered. The classic problem from power lines is a broken insulator (or other high-voltage breakdown mechanism) that causes broadband radiation to be emitted from the power line. This type of problem is very difficult to track down since the problem is transmitted via the distributed power lines. Some power companies are effective at resolving complaints of this nature while others have been the target of FCC enforcement action due to their lack of responsiveness. In some cases, the electric utility may not have the expertise to resolve the issue. These "broken insulator" problems are relatively simple compared to the kind of interfering signal that can be created by complex, broadband modulation schemes that will be required by BPL systems. The FCC must minimize the potential for interference by keeping emission levels low from any BPL device. Also, utility companies must be held accountable for any and all interference problems originating from their power lines.

Summary

The FCC has an obligation to protect the existing licensed users of the radio spectrum, including the Amateur Radio Service. Broadband Power Line systems are highly likely to interfere with existing users, so careful analysis, testing and trials must be carried out before this type of emission is authorized. In no case should the signal levels exceed the existing Part 15 limits. Utility companies that deploy these systems must be held accountable for resolving interference problems in a timely manner.

Finally, I urge the Commission to proceed with extreme caution in this matter due to the unlicensed nature of these devices and the potential for great harm to critical users of the radio spectrum.

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