



Broadband over Power Line: Why Amateur Radio Is Concerned about Its Deployment

Radio amateurs are not opposed to broadband services. On the contrary, they tend to be early adopters of new technology. However, there are ways to deliver broadband that do not pollute the radio spectrum as Broadband over Power Line (BPL) does. These include fiber-to-the-home, cable, DSL, and wireless broadband. The ARRL–The National Association for Amateur Radio– is supportive of broadband access for all Americans; however, it opposes BPL as a way to achieve this goal because of its high potential for causing interference to radiocommunication.

What is Broadband over Power Line?

BPL is the delivery of broadband Internet signals using electrical wiring to conduct high-speed digital signals to homes and businesses. BPL systems are designed to deliver Internet services using medium voltage power lines as the distribution medium and generally use the frequency range between 1.7 and 80 megahertz (MHz).

The Concern: Broadband + Power Lines = Interference

Because power lines are not designed to prevent radiation of RF energy, BPL represents a significant potential interference source for all radio services using this frequency range, including the Amateur Radio Service. Overhead electrical power lines and residential wiring act as antennas that unintentionally radiate the broadband signals as radio signals throughout entire neighborhoods and along roadsides. Interference has been observed nearly one mile from the nearest BPL source.

What is the status of BPL?

From a regulatory standpoint, BPL is an unlicensed, unintentional emitter of RF energy and is subject to FCC Part 15 rules. FCC rules require that BPL systems may only operate subject to the express condition that harmful interference is not caused to licensed radio services. BPL is not entitled to protection from interference. So far, BPL has been deployed in numerous temporary test sites but in few commercial installations. Despite the very limited deployment, considerable interference has been documented. In October 2004 the Federal Communications Commission (FCC) adopted new rules for BPL systems. These rules place new restrictions on BPL systems in recognition of the fact that they pose a greater threat of radio interference than most Part 15 devices, such as garage door openers. However, the new rules are not sufficient to reduce the probability of harmful interference to reasonable levels. Administrative appeals of the rules have been filed and court challenges are likely.

Why are the regulations inadequate?

The Communications Act of 1934 and the FCC Rules have long required that unlicensed emitters such as BPL systems must protect licensed radio services from interference, and that they must accept any interference to their operation that is the result of normal activity by licensed radio services. However, in practice it is often difficult to resolve such interference problems in the field. In one case in Cedar Rapids, Iowa, BPL engineers spent 12 weeks trying to solve an interference problem without success. The interference did not cease until the test was terminated prematurely.

Studies by the National Telecommunications and Information Administration (NTIA) show that the probability of interference from a BPL system operating at the FCC radiated emission limit on the same frequency as a typical two-way radio station is essentially 100% 200 to 400 meters from the power line, depending on the frequency. Despite this clear evidence that the limit is too permissive, the FCC declined to impose a tighter limit except in frequency bands used by aeronautical services. This means that unless they voluntarily design their systems for reduced emissions, BPL system operators will have to take expensive, customized steps to correct interference on a case-by-case basis. That may not be possible unless they turn off their systems. Of course, they will strongly resist having to do so. This is why radio operators are so concerned, and why BPL customers cannot be assured of receiving reliable broadband service.

Has the interference potential been proven?

The ARRL laboratory has made observations of BPL radiation at a number of trial areas. The lab's findings of interference and related information, including video and audio recordings of actual interference, are available on the Web at www.arrl.org/bpl. These and other observations of radio-frequency interference at BPL test sites in the US are a matter of public record in FCC files.

An April 27, 2004 report released by the NTIA acknowledges that BPL signals “unintentionally radiate” from power lines. The NTIA also said then-current FCC Part 15 measurement techniques may “significantly underestimate” peak BPL field strength and that “interference risks are high under existing FCC Part 15 rules.” The FCC rulemaking only partially addressed these concerns.

Although BPL proponents dispute these claims of interference to licensed services, they have provided little in the way of calculations or measurements of BPL radiation levels – and what they have provided has been flawed by technical errors.

Others at risk

- ◆ The “short waves” – the only part of the radio spectrum that supports long-distance, intercontinental radio communication. The short waves are used for international broadcasting, aeronautical, maritime, disaster relief, and other services including the military.
- ◆ The “low-band VHF” frequency range that is heavily used by volunteer fire departments, police, and other first responders.
- ◆ Depending on their distance from a BPL system, some public safety and federal government radio systems could receive harmful interference.