



It Seems to Us

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Of Frogs and Canaries

“Manmade pollution of the radio spectrum is a growing problem for everyone, but radio amateurs are the first to notice its effects.”

Do you know how to boil a frog? Assuming you would ever want to, don't toss the frog into a pot of boiling water. The frog will simply jump out, and if quick enough will be none the worse off. But if you put the frog in lukewarm water and slowly raise the temperature it will go to sleep before it realizes what's happening.

There are many analogies to the story of the frog, including radio spectrum pollution. Sometimes a potential source of unnecessary radio frequency interference (RFI) from unintentional emitters — devices that radiate RF energy even though their operation doesn't require it — is so obvious that it's like tossing the frog into boiling water. Such was the case a few years ago with Broadband over Power Lines (BPL): Anyone with a basic understanding of what happens when you put RF energy on an unshielded, unbalanced conductor — and who wasn't blinded by political pressure or greed — could see from the very beginning that it was a terrible idea.

At other times, the problem is revealed gradually and comes to a boil more slowly. It may even take a change in one's environment to drive home just how bad the situation has become in our own backyard. Last year, operators from all over the world converged on rural Massachusetts to compete in the World Radiosport Team Championship from tents set up hundreds of feet, and in some cases several miles, from the nearest external sources of manmade noise. A common comment, particularly from Europeans and Asians from densely populated urban areas, was how quiet the bands sounded compared to their home stations.

Talking with delegates to the IARU Region 3 Conference in Bali, Indonesia in mid-October drove the point home. Some reported they were unable to use some bands at all because of spectrum pollution levels in their neighborhoods. When they try, they are criticized for being unable to hear the stations calling them; this was a problem at the conference station, YB16IARU, set up at a hotel near a busy commercial street. Based entirely on anecdotal evidence, it appears that the problem, at least for now, is more severe in parts of Asia than in North America or Europe, but we can take no comfort in that; the trend everywhere is in the wrong direction.

Every radiocommunication service is negatively affected by spectrum pollution, but radio amateurs are usually the first ones to notice. We are, to use another analogy, like miners' canaries — the caged birds that were taken into mineshafts and whose distress or death warned of the presence of lethal gases. But unlike the luckless canaries, we do not have to submit quietly to our fate.

The sources of spectrum pollution are well known. Some, like arcing from power lines, pre-existed radio. Others are of much more recent vintage: variable speed motors in residential appliances and industrial equipment, solar controllers and inverters, unshielded data networking cables, and switchmode power supplies including the ubiquitous “wall warts,” to name but a few. Often cited in Bali as a growing source of interference were energy-efficient LED light bulbs that are popping up everywhere, in homes, businesses, and street

lights. None of these must inevitably pollute the spectrum; well-designed products manufactured to meet the design specifications and properly installed can accomplish their objective without doing so. Yet the problem is real and is growing.

As reported in the October 2013 issue of *QST*, ARRL Lab tests of LED bulbs showed that brand-name bulbs substantially met FCC regulatory limits and posed a low potential for causing interference. However, there were “...obvious problems associated with those bulbs purchased online from an overseas source.” Our colleagues in parts of Asia appear to be dealing with far more of the latter type.

Even bulbs that meet current FCC limits can be problematic in specific situations and in the aggregate, and with the rapidly growing market for energy-efficient lighting it is important to tighten spectrum pollution limits before it's too late. In October, in an FCC proceeding (ET Docket No. 15-170) ARRL suggested a modest reduction in emission limits for LED bulbs and improved labeling of certain lighting devices. Along the same lines, the IARU Administrative Council has taken steps to increase Amateur Radio involvement in international standards bodies.

What else can we do? First of all, we must not be like the frog and simply go to sleep as the water warms. Take an inventory of the RFI at your home station so you will have a base line against which to mark changes in your own environment. This will make it easier to track down new sources as they crop up, as they inevitably will.

When you encounter a product that pollutes the spectrum, complain about it: to the retailer, to the distributor, to the manufacturer, and to the FCC. Let us know, too. Keep in mind that just because two bulbs are labeled the same and look the same doesn't mean that if one doesn't cause interference the second won't, either; different factories or different batches from the same factory may be substantially different, and some products may even be counterfeit. There are plenty of examples of products that meet standards when first tested but whose later samples, when taken apart, reveal empty places on circuit boards where the RF filters are supposed to be.

Let's also remind our colleagues in other radio services that they share the same mine — the same spectrum — with us canaries. The same broadband noise that deafens our VHF and UHF equipment may keep public safety personnel from hearing their dispatchers and one another, possibly with tragic consequences. Working for a pollution-free radio spectrum environment is one more way we can address our public service obligation as radio amateurs.