

# Free Software Matters: Free Software and the Broadcast Media, II

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In my last column I discussed the pending proceeding of the US Federal Communications Commission to consider copy-protection for broadcast digital television. I described the significance of the GNU Radio program, which allows general-purpose computers to process waveform data received from wireless receivers and thus to interpret digital TV signals. Because GNU Radio is free software that any user has the right to understand and to modify, when GNU Radio is configured to receive broadcast digital TV, a user could modify the program to ignore the copy-protection—in the form of the so-called “broadcast flag”—under consideration by the FCC.

But GNU Radio’s role in challenging Hollywood’s preferred form of “content protection” for digital TV is just the beginning. In a much larger sense, over the next decade, free software will be an inherent part of a rebellion against the way the electromagnetic spectrum is managed throughout the world.

Since the late 1920s, governments everywhere have controlled the electromagnetic spectrum under conceptions of “stewardship,” “public trust,” or “public ownership.” In some countries this has meant government exercising complete control over broadcast media, in others government has “licensed” a few favored private parties to make exclusive use of particular frequencies. Some mix of government-controlled and private broadcasting has been the norm in many societies, as it has been in Great Britain for the last generation.

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All these arrangements have been predicated on two basic principles: that the electromagnetic spectrum is inherently a public resource ultimately owned by the people as a whole, and that technical factors require government to control the use of the spectrum in order to prevent what the economist Garrett Hardin famously called “the tragedy of the commons.” If everyone were free to use all frequencies of the spectrum however he or she liked, interference would frustrate everyone’s attempts. So, in the interests of the public, governments have given exclusive control over some frequencies to individuals and organizations, called “broadcasters,” who have acquired enormous social influence and power as a result of their ownership of the means of mass communication.

But the technical basis on which this system of broadcasting rests has grown shaky. The modern cellphone is an example of a device that shares the electromagnetic spectrum with tens of thousands of other similar devices, without creating the cacophony associated with unregulated broadcasting. “Wi-fi” data communications, capable of carrying voice and video signals as well as every other form of digital information, are similarly arranged around spectrum sharing. These are early examples of the twenty-first century approach to the electromagnetic spectrum, in which frequencies are optimally employed by being shared—used simultaneously by intelligent devices for all sorts of one-to-one, one-to-many and many-to-many communications—not by being exclusively “licensed” to a few “broadcasters” who gain the power to communicate with millions while everyone else merely watches or listens.

Although there are new, more efficient, and more democratic ways of using the public airwaves, governments remain in control of spectrum, assertedly on their citizens’ behalf, and governments either themselves control broadcasting, or—as in the United States—are dependent for their political success on the broadcasters they have licensed. As a result, the power of the *de facto* owners of spectrum is maintained by the power of the State.

But “software-controlled radios,” transmitters and receivers whose selection of frequencies and communications protocols are implemented in software, are going to become ubiquitous in the next decade; again, the cellphone is a familiar early example. And if the software in software-controlled radios is free software, users gain the ability to modify for themselves the rules about how spectrum is employed.

Could collectives of citizens “homestead” the spectrum, using free software and slightly modified transmitting and receiving hardware? Communications regulators in several countries are beginning to worry that they will soon be able to do just that. Broadcasters, already losing eyeball-share

to “the Internet,” are one constituency stimulating their worry. Badly battered telecommunications companies are another. If public wireless networks controlled by their users begin carrying significant amounts of voice and data traffic now carried over phone lines, local telephone service monopolies will be subjected to competition from a medium that is completely free.

So regulators are going to face increasing calls to prevent free software from running software-controlled radios, in the interest of preventing the public from using the public airwaves in the ways the public actually wants. Agencies that have traditionally controlled telephones and radio receivers are going to be attempting to control every general-purpose computer, and the software that runs on it. Free software is going to stand not only for free content, but also for free spectrum, and with it, free bandwidth. The same sort of challenge to their control that the content industries were facing in 2002, the bandwidth industries, both broadcasting and telecommunications, with all their power and their allies in government, are going to be facing long before 2012. A movement that originally seemed primarily a new kind of competitor for the PC software monopoly, and then became a threat to the sanctity of cultural ownership by Disney and other “content” companies, will soon be challenging the social control of bandwidth and the power of the broadcasters. Once again, when it comes to free speech, free software matters.