

Federal Communications Commission Proceeding #15-170

Subject: Amendment of Parts 0, 1, 2, 15, and 18 of the Commission's Rules *et al.*

Dear FCC Commissioners Clyburn, O' Rielly, Pai, Rosenworcel, and Wheeler,

I am writing in opposition to the Commission's proposed amendment to the rules that govern the evaluation and approval of RF devices. The core of the amendment would unduly burden device manufacturers, research groups, non-profit organizations, and end-users with deleterious certification obligations with no clear public benefit.

This claim is substantiated in many of the public and *ex parte* comments already filed with the Commission; in lieu of re-enumeration of these objections I instead wish to introduce points that have not been discussed at length:

Terminal Doppler Weather Radar (TDWR) is not a particularly sophisticated weather-imaging technique; akin to much of the United States' infrastructure it is a pre-WiFi technology beginning to show its age. I encourage the Commission to explore and evaluate a re-implementation of TDWR working with the National Severe Storms Laboratory—or other agencies as appropriate—especially in light of increasing frequency of extreme weather events. A modernized version of TDWR may be less sensitive to non-weather interference.

The insistence on correct, non-negotiable regulatory domain Country Code Selection—even at the expense of preventing users from communicating with each other wirelessly without non-modifiable/proprietary software drivers installed—represents a lost opportunity in international spectrum standardization. I understand and appreciate the broader concern of the possibility of radio devices emitting frequencies outside of FCC-authorized parameters; however, voluntary cooperation with 3rd-party firmware manufacturers and visibility efforts from the FCC Enforcement Bureau seem to be more appropriate measures than broad rule revisions.

I would be excited to see the creation of a spectrum-geomapping volunteer community and encourage the FCC to provide technical guidance and assistance as necessary to make this possible. I know we have work to do to make this a reality but associated technology to support this is just starting to become accessible and affordable.

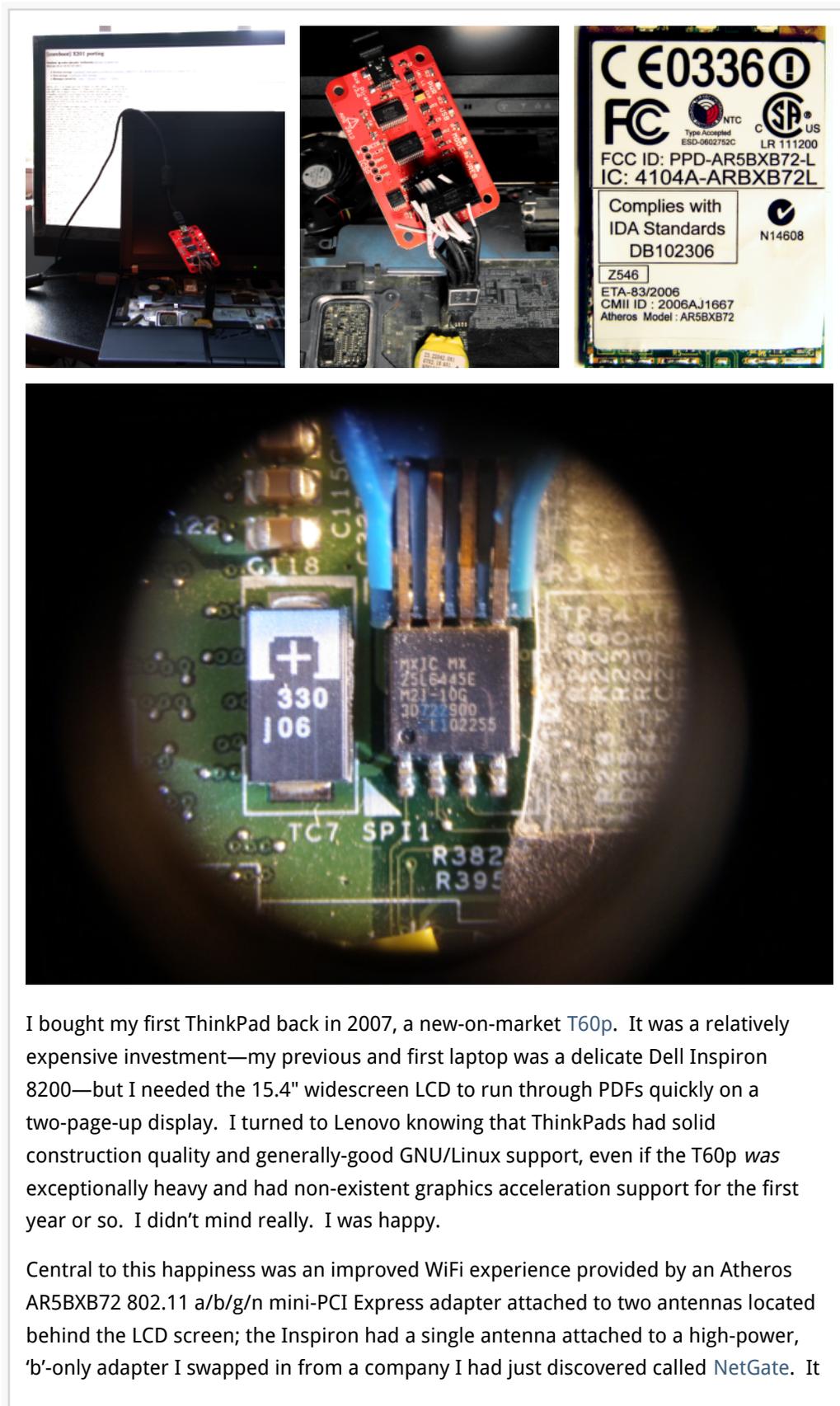
Finally, attached for reference purposes is at-length analysis of my hopes and frustrations in purchasing a new laptop with working WiFi. I hope you enjoy reading it.

Respectfully submitted,

A handwritten signature in black ink that reads "George Chriss". The signature is written in a cursive, flowing style.

George Chriss
Free Software Foundation Member #11490

I bought my first ThinkPad back in 2007, a... | technic_observations



I bought my first ThinkPad back in 2007, a new-on-market T60p. It was a relatively expensive investment—my previous and first laptop was a delicate Dell Inspiron 8200—but I needed the 15.4" widescreen LCD to run through PDFs quickly on a two-page-up display. I turned to Lenovo knowing that ThinkPads had solid construction quality and generally-good GNU/Linux support, even if the T60p was exceptionally heavy and had non-existent graphics acceleration support for the first year or so. I didn't mind really. I was happy.

Central to this happiness was an improved WiFi experience provided by an Atheros AR5BXB72 802.11 a/b/g/n mini-PCI Express adapter attached to two antennas located behind the LCD screen; the Inspiron had a single antenna attached to a high-power, 'b'-only adapter I swapped in from a company I had just discovered called NetGate. It

<http://gchris.tumblr.com/post/50463745980/a-closer-look>

was a neat experiment but not-quite-practical for day-to-day-work due to a lack of antenna diversity.

But alas, I disassembled my T60p for parts after I thought the mainboard power units bit the dust, which I learned later was simply caused by a defective power cable. In need of a new laptop, and having a generally-good experience with the T60p, I turned to Lenovo for a new-on-market Thinkpad X201i. At \$900 it was a cost-effective purchase providing a powerful but lightweight solution to my mobile computing needs. I opted for the cheapest WiFi adapter – why spend money on an upgrade option when I knew I would swap in my old adapter?

And the X201i came with *three* wireless antennas.

Upon arrival I made short work of reformatting the hard disk with a GNU/Linux distribution, booted, saw that all was well, then shut down the laptop for the adapter swap-out. It took several minutes to figure out how to connect the antennas and even how to fit the full-size adapter into half-size mini-PCI slots, but with that accomplished I hit the power switch while taking pride in the overall efficiency of the process.

A second later, an obnoxious beep and the following ominous message appeared in white lettering on a black screen:

1802: Unauthorized network card is plugged in - Power off and remove the miniPCI network card.

Normally I would have assumed this was a Linux-kernel issue—boot error messages are displayed in the same fashion—but this was different.

Part 2: A Closer Look

As early as 2003 IBM instituted a policy¹ of refusing to boot laptops with adapters not on pre-approved whitelists; the number of approved cards for a given model is typically less than five. This policy change resulted in the '1802' error I encountered above and remains in effect for all new laptops sold. I'm under the impression—citable correspondance is hard to come by—that the lock-out is designed to enforce end-user compliance with FCC regulations even if the FCC has no actual policy directing manufacturers to do so. Forced obsolesce thus becomes a part of Lenovo's overall business strategy, under color of FCC compliance, at the expense of user freedom.² Tellingly, one cannot buy a new ThinkPad that does not include a new WiFi adapter.

In fairness the FCC *does* require “intentional emitter” radio-frequency (RF) devices to undergo comprehensive testing; the risk that a particular combination of adapter

firmware, independently-developed device drivers (e.g., kernel modules), and antenna configuration could result in RF emissions in excess of FCC permissible levels is non-trivial especially given the deleterious effect such a non-compliant configuration would have on others sharing the spectrum. The FCC mandates devices be tested as a whole³ and correspondingly places limitations on end-user configuration. Any change to the device as-FCC-certified must be approved in writing in advance by the FCC. But given that WiFi's spectrum allocation was based on "a home networking technology for nomadic users...through a wireless connection that operates at relatively short distances,"⁴ prior FCC certification of previous, non-whitelisted adapters, and similarities in design between Lenovo laptops, it's hard to imagine substantial emission differences that would cause meaningful concern by any party involved. In this case FCC over-regulation, in combination with an unwillingness to provide enforceable end-user protections against wayward manufacturers, is stifling marketplace innovation.

I posit the FCC should take into policy consideration the following three suggestions:

- Overhaul the Office of Engineering and Technology Equipment Authorization database – correspondence is difficult to navigate and discover. Additionally, it is not possible to link directly to a specific document, thus impeding meaningful conversation on the same data set.
- Allow 3rd-party 'Permissive Change' certifications. Currently, only Lenovo may authorize an alternate adapter, firmware, or antenna to be tested as being FCC-compliant in a particular model.
- Explore ways to improve developer and hobbyist access to "pre-certification" RF-measurement and diagnostic tools.

I'd like to take a moment to thank Ernie "Chip" Douglas for his helpful perspective on these issues.

Part 3: Coreboot

"With the right background and some months of development the answer can become yes." —Peter Stuge, a coreboot developer on the complexities of providing free/libre BIOS images ([source](#))

Initially, and in the least efficient manner possible, I managed to flash a lightly-patched BIOS image that bypassed all whitelist checks. It was a stopgap measure that also underscored the need to find a better, permanent solution; looking through strings in the original BIOS binary image reveals at least one objectionable code comment. This is code that I don't care to run and trust for production-level work.

BIOS development is in many ways more complex than kernel development and, to boot, failed flashing yields rather expensive paperweights.

The above images show a Bus Pirate attached directly to my x201i BIOS chip in preparation for flashing a self-built [coreboot](#) image. It's a work-in-progress but I'm excited about the initial progress I've made and the prospect of running a fully-free operating system. Stay tuned for updates.

[1] Durey, Lincoln. "Linux and IBM : "Unauthorized" Mini-PCI : TCPA Updates." *linux-kernel mailing list*. 3-June-2003, accessed 19-May-2013. <https://web.archive.org/web/20130511061545/http://lkml.org/lkml/2003/6/3/162>

[2] SparkFun has an excellent writeup titled [The FCC and Open Source Hardware](#) that provides a detailed overview of the certification process.

[3] Lane, Bill. "Topic 10: License-Exempt Wireless Applications for Public Safety." *FCC Tech Topics*. Accessed 19-May-2013. <http://transition.fcc.gov/pshs/techttopics/techttopics10.html>

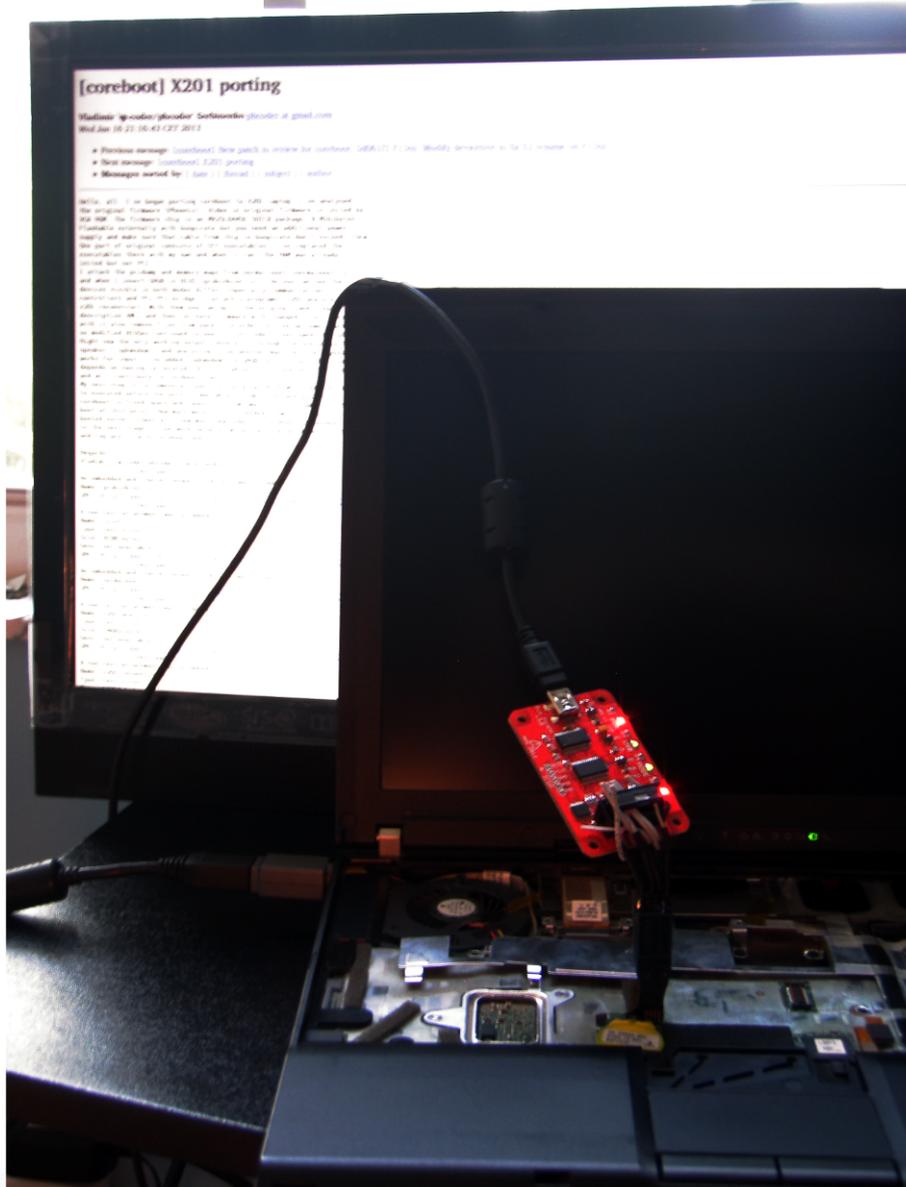
[4] Lenovo is granted Freedom of Information Act exemptions for proprietary "BIOS Lock" and antenna design features, complicating independent evaluation and development work.

Posted 2 years ago

#BIOS #Bus Pirate #FCC #FCC Reform #Lenovo #SOIC #ath9k #coreboot
#device interoperability #flashrom

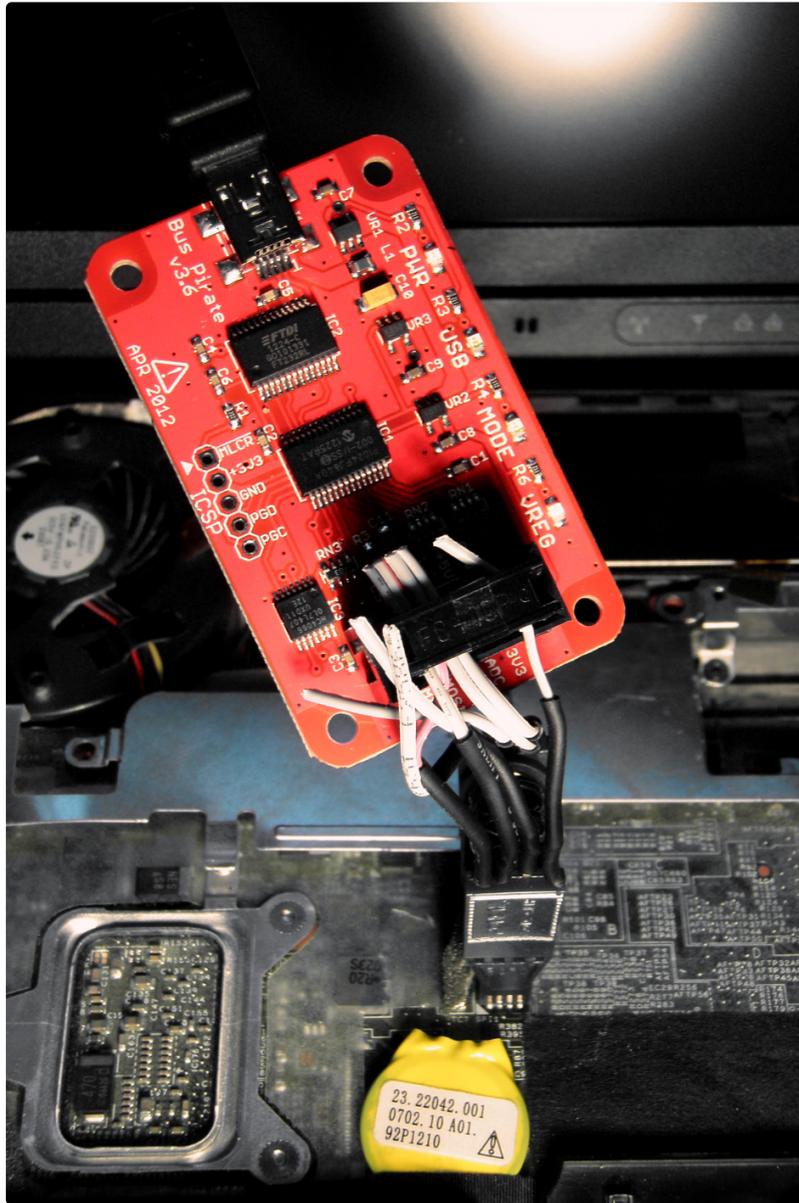
0 notes,
0 comments

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A Bus Pirate attached to my Lenovo X201i, reading the contents of the BIOS chip directly.

<http://gchrisr.tumblr.com/post/50463745980/a-closer-look>



Bus Pirate attached to an 8-pin Pomona SOIC clip. Lead wires are kept intentionally short.



Atheros AR5BXB72, supported by the ath9k kernel module.
The round gold pins are the antenna connectors.