

Issues with the Open Hardware Model

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Talks Preview

- I have Algoram Katena hardware to show.
- On Saturday I will do a talk on an operating-system-independent web front panel for radio devices. No porting!
- Chris Testa KD2BMH is not at the conference, he has another commitment. He'll be at Pacificon next weekend, and we'll be exhibiting and presenting papers.

History of Evangelism

- I have been evangelizing Open Source and Open Hardware to TAPR since shortly after the failure of the Frequency-Hopping Spread Spectrum (FHSS) project.
- FHSS was TAPR's first effort to produce a high-bandwidth data radio for Radio Amateurs, something we're *still* trying to get done today.
- FHSS depended upon a vendor's ASIC chip which was end-of-lifed.
- This made a point to TAPR about owning your technology, including ASICs and embedded software.

Success of Evangelism

- I was actually the person who announced “Open Source” to the world, but this is of course standing on the shoulders of Richard Stallman and Free Software.
- This effort has been so successful that I can now sit back at TAPR conferences and watch other people do Open Source evangelism.
- Witness Michael Ossman's talk at the TAPR/AMSAT banquet.

Open Hardware Evangelism

- I have also evangelized Open Hardware to TAPR, and participated in the creation of the TAPR Open Hardware license.
- However, Open Hardware has not been as successful as Open Source in execution, and presents legal issues, including ones in which it can actually do harm.
- Because of these issues, I stopped evangelizing Open Hardware in 2013.
- If I evangelize, it's also my responsibility to tell the world when I'm wrong.

Algoram Katena Radio

- Chris Testa KD2BMH and I have been working for about 4 years now on making a handheld SDR with embedded computer which we now call *Katena*.
- It's heartbreakingly close to done, there is at present one chip left to turn on (a USB driver) and we'll probably have to do a board turn to reduce interference on the board.
- Our commercial market is land-mobile. Hams are early adopters and software developers.
- We're shopping for grants or venture funding to go full-time.
- Our personal financial and time investment is *high*.

Other Similar Efforts

- Northwest Digital Radio has been working on a 440 data radio called the UDRX-440, based on the same transceiver ASIC as our design.
- AMBE chip products seem to be their focus of late. Last news about UDRX-440 on web site is from Q1 2014.

Open Source Software in Katena

- Katena is based upon Open Source software. New work which we produce is dual-licensed under *Affero GPL 3* and a commercial license.
- Affero GPL 3 is a modern version of the GPL license which includes terms for Software-as-a-Service (what Google does).
- It's a share-and-share-alike license, and requires contribution of modifications to the community.
- We make a commercial license available if you don't want to contribute modifications to *our* software. There is licensed software from other people in our system that it doesn't apply to.

Open Source Software Works Well

- Open Source Software licensing is well-supported by copyright law.
- I have participated in the seminal court cases regarding it, and it is now well-supported by *case law*.
- If we use dual-licensing, it gives us a way to have our cake and eat it. We can sell licenses to other manufacturers, and still be Open Source.

Open Hardware Licensing Does *Not* Work Well

- Open Hardware licensing only works as the developers would have it work when there is a *patent* on the design.
- Patents are expensive to pursue, and not particularly attractive to people who work on Open things.
- Open Hardware licensing attempts to work using copyright but is unsuccessful in doing so.
- If law changes made it work using hardware, it could actually do us harm. We could, through our own actions, make that happen.

17 CFR 102(b): Subject Matter of Copyright

In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.

- This is meant to separate copyright and patent.

Impact

- Purely functional things are not considered to be subject to copyright.
- The exception, widely used to copyright software, is that your artistic decisions are copyrightable when there is more than one way to implement a function.
- Circuit designs in schematics are not generally held to be copyrightable.

Result

- Devices built from a design in a schematic do not infringe upon the copyright of the schematic.
- You can manufacture any design that you take from an Open-hardware-licensed schematic without regard to the license.
- Other things in the device, for example the bit-stream used to program a gate-array and the software which runs in the device, may be copyrightable.

Economic Issue

- Chris and I have significant investments of both time and cost into the *Katena* design.
- We are OK with hams producing their own versions of the design for use on ham radio. However, we need to protect our land-mobile market.
- The problem would be low-cost clones of the device, probably from Chinese manufacturers who have not made the development investment that we have.

Example

- *HackRF* currently has a Chinese clone called *HackRF Blue*.
- When we last asked him, Michael did not feel that HackRF Blue had a significant financial impact on his operation.

Advantages of Clones

- Having a design by completely open may lead to very-low-cost production of that device, which is an advantage to the consumer.
- This is presently being seen with the Arduino.

Cross-Over

- When you make something Open Hardware today, you essentially grant it to the public domain, because of the problems with Open Hardware licensing.
- This is perfectly OK if that grant won't damage you.
- Projects that are externally funded with no profit expectation (HackRF, TAPR projects) would be perfectly fine.
- If you are at risk of losing a substantial development investment, it's not fine.
- *Katena* has hit this cross-over point.

Why Isn't This The Case for Open Source Software

- In the case of Open Source, we have developed a number of viable ways to have our cake and eat it.
- Dual-licensing may be the best. Those who have an economic incentive to not share are motivated to purchase our commercial license.
- There are other ways to make money, such as support, and the vending of commercial versions with enhancements not available as Open Source.

Creating New Norms

- The *creation of new norms* is the way that Open Hardware licensing can actually do harm to people like us.
- Courts tend to follow the ways in which industry “innovates” new intellectual property processes.
- So, what would happen if courts and law made schematics copyrightable?

Impact on the Industry

- We've all learned electronics from published schematics.
- What if those schematics became copyrightable, and their owners gained the ability to charge us for their use.
- Many published since the 1970's will be copyrighted for the author's lifetime plus 95 years.
- Their owners will start trying to monetize them.

So

- Imagine a world in which schematic designs were copyrightable and where we would not be able to use a schematic that we read in a magazine without the need to pay a royalty.
- So, even if it benefits Open Hardware licensors to have working copyright protection, it would create a much more restrictive world for all of us.
- This would not be to the advantage of Open Hardware.

Is it Impossible?

- For decades we had a legal theory that APIs could not be copyrighted.
- The conduct of Sun Microsystems (later Oracle) regarding Java has led an appeals court in *Oracle v. Google* to declare that APIs can be copyrighted.
- The supreme court refused to hear the case, and the finding of the appeals court has stood.
- It is already becoming possible to copyright some functional designs.

Think Back

- TAPR's most successful hardware design was the TNC 2, which had proprietary elements and was licensed to manufacturers by TAPR.

What Should We Do

- Continue to produce Open Hardware licensed devices where we can afford to do so.
- Consider proprietary hardware designs in which designers may own copyrights, patents, and trade-secret rights, and TAPR will have the right to sublicense these rights.
- Don't get in a situation where TAPR is not licensed to continue to produce, and extend, devices which it has funded, as happened with HPSSDR. Don't accept limits on numbers of devices.
- Accept that manufacturers might close their designs after TAPR support and make improvements. TAPR can continue to produce and improve upon its own version.

What Should We Do

- Continue to seed new businesses that produce Amateur Radio hardware.
- Develop sound economic models for them.
- Learn from the mistakes we made with previous business relationships of TAPR, for example the business that produced HPSSDR hardware that could not be sold because we could not produce other necessary hardware.

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