Open Source Satellite Work is Free of ITAR and EAR

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Export regulations divide both technical information and actual hardware into three categories. The most heavily restricted technologies fall under ITAR, the International Traffic in Arms Regulations, which are administered by the State Department. Technologies subject to more routine restrictions fall under EAR, the Export Administration Regulations, administered by the Department of Commerce. Technologies that are not subject to either set of regulations are not restricted for export.

ITAR and EAR have dramatically affected commercial and amateur satellite work since at least the mid-1990s. The regulations are blamed for a significant decline in U.S. market share for satellite systems and halted highly successful international amateur collaborations.

There is a public-domain exception in both ITAR and EAR. Open source work that is published as it is created, and is freely available to the general public at no cost, is not subject to ITAR or EAR.

Open Research Institute (ORI) was founded in March 2018 by Bruce Perens to provide a formal structure for open source satellite work. Bruce invited Ben Hilburn and me to be the founding officers. ORI is headquartered in California, USA. Participants come from all over the world.

ORI was set up as a project-based research institute and not as a member society. Memberships would not be sold in order to not compete with amateur satellite membership organizations in any way. All work would be freely available to the general public in compliance with ITAR and EAR.

ORI became a 501(c)(3) in March 2019 and began fundraising with the Trans-Ionospheric conference badge project. This was successful and allowed for open source satellite technical and regulatory work to proceed. While all the legal advice so far had affirmed ORI,Äôs interpretation of ITAR and EAR public domain carve-outs, some potential funding sources wanted to see a formal legal opinion.

Our choices were to continue insisting we were right or to be effective. ORI chose to be effective.

In July 2019, Bruce Perens interviewed several law firms aligned with ORI's goals and values. We selected one recommended by the Electronic Frontier Foundation (EFF). ORI began working with Thomsen & Burke LLP to form a legal strategy that would clearly and explicitly solve the ,ÄúITAR/EAR problem,Äù for amateur radio satellites.

From May - September 2019, I campaigned in a contested election to the AMSAT-NA Board of Directors and won a seat. AMSAT stands for AMateur SATellite and is composed of a number of organizations around the world that support the amateur satellite service. AMSAT-NA is the North American amateur satellite advocacy organization. The name of the North American organization is frequently shortened to AMSAT.

In November 2019, December 2019, and January 2020, ORI reached out in writing to AMSAT-DL, JAMSAT (AMSAT Japan), AMSAT-UK, AMSAT-NA, EFF, the Institute for Electrical and Electronics Engineers (IEEE), American Radio Relay League (ARRL), Open Source Initiative (OSI), and multiple Universities and individuals active in open source and amateur radio. The communication outlined the legal strategy, invited collaboration, and asked for statements of support. All organizations responded to or at least acknowledged the letter, except AMSAT.

The legal strategy consisted of three parts. The first was a Commodity Jurisdiction Request to the U.S. State Department asking for a Final Determination Letter that said that open source satellite work was free of ITAR. The second was a classification request to the U.S. Commerce Department that would use the Final Determination to synchronize classification under EAR. The third was an Advisory Opinion Request to U.S. Commerce clarifying the result from the U.S. Commerce Department. This final step would provide needed guidance on publishing requirements and make it abundantly clear that open source satellite work was indeed free. Being free to work with others in the open is vastly superior to complying with onerous and punitive regulations designed to ensure "national security."

On February 20, 2020, Open Research Institute filed a Commodity Jurisdiction Request with the U.S. State Department, seeking to establish that key technologies for amateur radio are not subject to State Department jurisdiction. ,ÄúInformation and Software for a Digital Microwave Broadband Communications System for Space and Terrestrial Amateur Radio Use,Äù was assigned the case number CJ0003120.

As encryption is allowed under Part 97 amateur satellite rules, the use of encryption was deliberately included in the request. The inclusion of encryption mandated that the Bureau of Industry and Security review the request, which lengthened the schedule. The Department of Defense and the Department of Homeland Security also reviewed the work, as both departments have a significant interest in regulating communications satellites and communications technology.

On August 11, 2020, The United States Department of State ruled favorably on Open Research Institute,Äôs commodity jurisdiction request, finding that specified ,ÄúInformation and Software for a Digital Microwave Broadband Communications System for Space and Terrestrial Amateur Radio Use,Äù was definitely not subject to State Department jurisdiction under ITAR.

The technology was not subject to State Department jurisdiction. This was the best possible outcome of a C.J. request. The news was publicly announced.

The Final Determination letter, Commodity Jurisdiction cover letter, and the application itself can be found at: **github.com/ phase4ground/documents/tree/master/ Regulatory.**

A list of Commodity Jurisdiction request summaries can be found at the State Department website at: **www.pmddtc.state. gov/?id=ddtc_kb_article_page&sys_id=6e a6afdcdbc36300529d368d7c96194b.**

Under this Final Determination, the technologies were subject to the EAR. The next step was to submit a classification request to the Commerce Department. Work began on the request with Thomsen & Burke LLP.

In October 2020, the classification request was submitted to the U.S. Commerce Department.

During the AMSAT board meeting at the 2020 Symposium (October), I moved for AMSAT to adopt the regulatory results from ORI as AMSAT,Äôs open source policy, using ORI,Äôs participant and

developer policies and open source approach as a template that would be customized for AMSAT. The motion also included a companion policy for closed-source/proprietary work, as there was no written policy for ITAR/EAR of either type. We would coordinate with both F.D. Associates and Thomsen & Burke LLP to write this two-pronged policy. This would completely cover AMSAT for any kind of project.

The rest of the board wanted to establish instead an ,ÄúOpen Source Committee,Äù that would produce a report in 90 days.

The 90 days expired without a report. The committee was renewed for another 90 days. That 90 days also expired without a report. I volunteered to participate on this committee but was not included.

In January 2021, a classification of all the items, as requested, was received from the U.S. Commerce Department.

Work began with Thomsen & Burke to draft an Advisory Opinion Request asking that openly published work ceases to be subject to the EAR. This established a full chain of documentation for open source amateur radio satellite service work.

On February 23, 2021, the Advisory Opinion Request was sent to the U.S. Commerce Department.

On September 2, 2021, the U.S. Commerce Department confirmed Thomsen & Burke LLP,Äôs advice that posting information on the internet so that it is available to the public means it is not subject to the EAR.

Classification and Advisory Request documents can be found at: github.com/phase4ground/documents/tree/master/Regulatory

Many organizations have picked up the regulatory results, expressed appreciation, asked questions, and indicated they are incorporating the results into their work and policy documents.

The legal costs were fully reimbursed with a generous grant from Amateur Radio Digital Communications (ARDC). See **www.ampr.org/grants/grant-open-research-institute/**.

ARDC and ORI share a vision of clearly establishing open source as the best and safest way to accomplish technical volunteer work in amateur radio. The regulatory work provides solid support for that vision. The

path is clear for a number of interesting projects facilitating new methods for terrestrial and satellite communications, opening the door to robust global digital amateur communications.

Current work with Thomsen & Burke LLP is to write documents that explain how others can best use these results. This has significant relevance in industry and academia. Our goal is to make it as easy as possible to use the results.

The FAQ, optional notice, and training can be found (as soon as they are completed) at **github.com/phase4ground/documents/tree/master/Regulatory**.

Will there be additional filings? The goal of any additional filings is to build a body of work that solidly supports a wide variety of open source work. This is somewhat similar to the way patent portfolios work in commercial settings. It's the sort of thing AMSAT could, and honestly should, be helping with.

This effort gives direct and considerable benefits to many organizations, but it benefits AMSAT in particular. It allows free and open international collaboration, dramatically reduces legal risks, increases the potential volunteer corps, simplifies fundraising, and reduces management burdens.

The work applies to orbits besides GEO and technology besides DVB-S2/X. Those that "insist" on extremely narrow final determinations can write their own Commodity Jurisdictions requests and expect to get the same result because they can use this one in their request as a model and reference. As said before, additional filings would greatly benefit the community because a population of results strengthens the case for open source work. However, additional filings are not necessary to use the results.

The key to using these regulatory results, or any like it, is that the public domain carve-outs in ITAR and EAR are solid and provide a bright path out of a bad place. To use them, one has to commit to documented open source policies and follow the law with regard to what constitutes publishing. According to the Advisory Opinion Letter, if it is published, it must be free.

Publishing work as it is created, freely available to the general public, is the way to use the public domain carve-outs in the law. Publishing designs and data that allow the recreation of a work of software

or hardware means publishing schematics, Gerber files, bills of materials, source code, tools required, test data, test plans, and the license that work uses.

This last part is often overlooked but is a necessary part of a compliant open source policy. ORI recommends the CERN open hardware license or the TAPR open hardware license for hardware. ORI recommends GPL version 3.0 for software. Any license recognized by Open Source Initiative is an excellent starting point. Providing regular copies of work to a public library, whether in print or DVD, is a baseline approach for a publishing policy. Using GitHub or GitLab is another recommended baseline policy.

ORI recommends the CERN Open Hardware License v2 because of the way it enables a useful open source hardware definition in a world dominated by a wide variety of proprietary tools. For example, FPGA design is a large and growing part of our world in advanced open source digital communications and is the central service provided by ORI,Äôs Remote Labs. Find more information about Remote Labs here: **github.com/phase4ground/documents/tree/master/Remote_Labs**.

Since open source tools for FPGA are currently not capable of executing some of the required designs, as long as the tool or component meets the definition of ,Äúavailable component,Äù, then the use of things like proprietary tools are allowed in the production of an open source design.

Following the example of FPGA work, this means that the VHDL source code is available for free to the general public. The FPGA is listed in the bill of materials and can be purchased. In addition, the version of Xilinx Vivado is listed and can be obtained.

ORI,Äôs developer and participant policies can be found here: **openresearch.institute/developer-and-participant-policies/.**

This regulatory work is a significant and positive result for the commercial and industrial world, as well as in amateur and academic circles. The goals for the amateur radio satellite service should be the absolute minimum regulatory fear and risk for amateur volunteers and a maximum amount of free and open international technical cooperation.

Thank you! Contact ORI with questions about the legal work at **ori@openresearch.instiute.** ●