



# FCC Part 97 Amateur Radio Licensing for CubeSats

## Why Amateur Radio?

The use of amateur radio on satellites dates back to 1961 when OSCAR 1 (Orbiting Satellite Carrying Amateur Radio) was launched. As of January 2018, 92 satellites of all sizes, carrying amateur radio, have been launched and successfully operated by “hams” in countries worldwide.

Amateur radio provides access to a variety of frequencies from shortwave to microwave, for amateur satellite use. In flying an amateur radio on a CubeSat, the radio becomes more than a simple command and telemetry link by opening the door to access by amateur radio operators and students worldwide, of all ages from elementary through college, greatly increasing the availability and participation in STEM education and the collection and study of student experiments carried on the satellite. In addition, as students earn their amateur radio license they gain valuable and broad knowledge of communication techniques that can be applied to a variety of space related projects in spacecraft and ground station design, as well as terrestrial communications on Earth.

## Part 97 vs. Experimental Licensing for Amateur Radio Frequencies

While experimental licenses can be obtained for use of amateur radio band frequencies, the bands are becoming crowded and the non-interference nature of the experimental license becomes problematic as the number of experimental and amateur radio satellites increase. Part 97 licensing provides a better way to use the frequencies with more options and protection as well as the greater contribution to space communication science as a whole through the open nature of amateur radio. But it’s not quite as simple as saying “we are going to get an amateur radio license.”

## The FCC and Amateur Radio

The Amateur Radio Service exists for specific reasons that are stated in Part 97.1 of the rules. Radio amateurs have been allocated an important part of the radio spectrum since the beginnings of radio, because of the amazing contributions to communications, particularly the ability to provide a large pool of volunteer emergency communication resources both human and hardware; to technical advances of the radio art; to the self-achieved skills in communications and technical phases of radio; and to the international goodwill that comes through communications between people with the same hobby with such a variety of interests. That is not to be taken lightly. With the rapid expansion of wireless communications, the radio spectrum is extremely valuable and able to command high dollar prices for the opportunity to use those frequencies. Yet, the United States (and other countries as well) recognizes the ongoing value of providing pieces of a large variety of spectrum from very low frequency through microwave to radio amateurs as part of maintaining and expanding the radio capabilities and lives of their citizens. The Federal Communications Commission is the watchdog of the amateur radio

frequencies and rightly seeks to ensure that they are used as set forth in the Code of Federal Regulations. This has had the appearance especially lately, with the explosive growth of CubeSat launches, of being an unnecessary roadblock or an annoying burden in the Part 97 licensing of spacecraft for launch. Overall, AMSAT does not feel that the FCC has taken an improper view of the use of amateur radio on satellites, rather it seems that the FCC is showing due diligence in licensing stations in the amateur radio service. That can cause headaches if there is not a full understanding of the amateur radio rules by the license applicant, or there is disagreement with how the FCC views the application of the rules. While there is work to be done in reaching an understanding by both potential applicants/users of amateur radio satellite stations and the FCC, and AMSAT and the American Radio Relay League are working with the FCC on formulating clear guidance and procedures for license applications, the clearest way to proceed is in keeping with the true spirit of the amateur radio service.

## What is an Amateur Radio Space Station, then?

The most recent guidance from FCC is that an amateur radio satellite is expected to provide full time two-way radio communications open to any amateur radio operator. Putting operating restrictions of the CubeSat/satellite radio due to maneuvers, power, propulsion and so forth aside, this means that it is expected that the amateur radio on the satellite will be primarily used for two-way communications and not exclusively for command and control uplink and telemetry or science data downlink. Additionally, as amateur radio does not allow for encryption of data other than command and control, any science data returned from experiments must be able to be received by any amateur radio operator in plain form e.g. “readable” information that could be interpreted and used by anyone. Part 97 is very specific about the use of amateur radio for “pecuniary interest”. Further, FCC generally views data from an experiment or device which can be used for financial gain that is sent via amateur radio as being pecuniary interest, regardless the presence of two-way amateur radio on board the satellite. However, when the experiments on board exist because the design or construction and the use of the science data being sent via amateur radio along with the two-way communications is solely for the education of students involved in the project and/or is of general interest to the public, the experiment aligns with the amateur radio service. Some examples of this would include the imagers on AMSAT’s Fox-1Cliff and Fox-1D CubeSats which were built by students at Virginia Tech, or the experiment by students at Russia’s Kursk State University flown on ARISSat-1 which was deployed from the ISS. There are many more examples to be found by looking at the details of amateur radio satellites that have been launched.

## Where to go from here –

AMSAT is a 501(c)(3) corporation of amateur radio operator volunteers who have and pursue their common interests through building, obtaining launches for, and operating amateur radio satellites. We partner with educational institutions providing opportunities to fly STEM experiments on our satellites, as well as offering designs and hardware for amateur satellite radios to those with a genuine interest in building and flying an amateur radio satellite with experiments of their own. AMSAT has 48 years of experience in designing and producing amateur radios for satellites. Whether you wish to build your own radios based on our documents or fly our radios, and learn along the way, we are happy to work with you.

Please visit [www.amsat.org/partners](http://www.amsat.org/partners) for more information.