

AMATEUR RADIO AND EXPERIMENTAL LICENSING FOR CUBESATS

AMSAT[®] The Radio Amateur Satellite Corporation

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FEDERAL COMMUNICATIONS COMMISSION INTERNATIONAL AMATEUR RADIO UNION

FCC

- Regulates Amateur Radio in the U.S.
- U.S. Code of Federal Regulations
Title 47: Telecommunication
 - Chapter I → Subchapter D → Part
97 — AMATEUR RADIO SERVICE
 - Subpart C—Special Operations
 - §97.207 Space station.

IARU

- Provides worldwide Amateur Radio
Satellite Frequency Coordination
- U.S. is in Region 2
 - Andrew Glasbrenner, KO4MA
 - Lee McLamb, KT4TZ
 - Edson Pereira, PY2SDR



FCC DA: 13-445

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GUIDANCE ON OBTAINING LICENSES FOR SMALL SATELLITES

- For Amateur pre-launch notifications:
 - b. A letter from the International Amateur Radio Union (IARU) indicating completion of coordination.
- For experimental licenses:
 - h. If the satellite will operate in bands allocated to the amateur satellite service, but will provide no amateur service, the information required in connection with an amateur pre-launch notification and the results of any notification to or coordination with the IARU.
 - i. On a case-by-case basis determined by the FCC, which will depend in part upon the geographic scope of the proposed operations, the information required in connection with an amateur pre-launch notification.



IARU COORDINATION

- The International Amateur Radio Union (IARU) is an organization consisting of over 160 national amateur radio societies around the world.
- Created in Paris, France, the International Amateur Radio Union has been the watchdog and spokesman for the world Amateur Radio community since 1925.
- The International Telecommunication Union (ITU) is the United Nations agency that deals with information and communication technologies. The Radiocommunication Sector of the ITU (ITU-R) manages the international radio-frequency spectrum and satellite orbit resources. One of the primary activities of the IARU is to work within the ITU structure to **preserve and maintain the spectrum allocated to the amateur radio and amateur-satellite services** and to promote the usefulness and value of amateur radio.



IARU COORDINATION

- IARU Short Information Paper describes what missions can be coordinated in amateur spectrum based on ITU Radio Regulations
- Educational and amateur radio missions: ...sole aim of educating people about space, electronics and all aspects of physics involved in space; as well as satellites used for amateur radio “self-training and communication”, with no pecuniary interest.

IARU COORDINATION

- IARU Short Information Paper describes what missions can be coordinated in amateur spectrum based on ITU Radio Regulations
- Experimental and research missions are missions with one or more of the following purposes:
 - To demonstrate a novel space technology in the space environment
 - To perform a proof-of-concept for a certain application involving one or more nanosatellites and pico satellites
 - To perform space research (primarily earth-orbiting, but also lunar and deep space applications).
 - In general **these missions will use frequency bands allocated to the space operation, space research and Earth exploration-satellite services.**

IARU COORDINATION

- IARU Short Information Paper describes what missions can be coordinated in amateur spectrum based on ITU Radio Regulations
- Commercial missions, i.e. delivering a certain service in certain areas of applications **with a clear pecuniary interest, will operate in frequency bands allocated to that specific service.** Examples include missions for Earth observation and telecommunication.

IARU COORDINATION

- IARU Short Information Paper describes what missions can be coordinated in amateur spectrum based on ITU Radio Regulations
- Combined missions: A combined satellite mission has an amateur payload and a separate payload that belongs to a different service. Both payloads, including for tracking, telemetry and command for the operation of the satellite (TT&C) shall use frequencies allocated to their own specific service. It is not permitted to operate an amateur-satellite system in combination with other telecommunication services.

IARU COORDINATION

- Start early! Coordination is a process. Some coordinations happen quickly, and others take multiple iterations.
- The IARU may decline coordination
- Understand you may be coordinated on a different frequency than you submitted.
- Use the latest form from the IARU website. (currently V.39)
- Involve your national amateur radio organizations (AMSAT, ARRL, RAC, RSGB)

<http://www.iaru.org/satellite.html>



GUIDANCE FOR FCC AMATEUR LICENSING

THIS INFORMATION IS BASED ON MY EXPERIENCE.
IT IS NOT INTENDED TO REPRESENT THE FCC.



GUIDANCE FOR FCC AMATEUR LICENSING

RELEVANT POINTS TO CONSIDER AND FULFILL

- §97.1 Basis and purpose.
 - The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:
 - (a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.
 - (b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.
 - (c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communication and technical phases of the art.
 - (d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.
 - (e) Continuation and extension of the amateur's unique ability to enhance international goodwill.



GUIDANCE FOR FCC AMATEUR LICENSING

RELEVANT POINTS TO CONSIDER AND FULFILL

- **You must have a FCC licensed amateur radio control operator**
 - §97.207 (a) Any amateur station may be a space station. A holder of any class operator license may be the control operator of a space station, subject to the privileges of the class of operator license held by the control operator.
- §97.113 Prohibited transmissions.
 - (2) Communications for hire or for material compensation, direct or indirect, paid or promised, except as otherwise provided in these rules;
 - (4) Music using a phone emission except as specifically provided elsewhere in this section; communications intended to facilitate a criminal act; messages encoded for the purpose of obscuring their meaning, except as otherwise provided herein;
 - (5) Communications, on a regular basis, which could reasonably be furnished alternatively through other radio services.



GUIDANCE FOR FCC AMATEUR LICENSING

RELEVANT POINTS TO CONSIDER AND FULFILL

- §97.113 Prohibited transmissions.
 - Messages encoded for the purpose of obscuring their meaning, except as otherwise provided herein;
 - §97.211 Space telecommand station.
 - (b) A telecommand station may transmit special codes intended to obscure the meaning of telecommand messages to the station in space operation.
 - **Downlink telemetry and communications can not be obscured (encrypted)**
 - **Use of science gathered via amateur radio downlink for profit (“pecuniary interest”) is prohibited**



GUIDANCE FOR FCC AMATEUR LICENSING

RELEVANT POINTS TO CONSIDER AND FULFILL

- §97.113 Prohibited transmissions.
 - (3) Communications in which the station licensee or control operator has a pecuniary interest, including communications on behalf of an employer, with the following exceptions:
 - (iii) A control operator may accept compensation as an incident of a teaching position during periods of time when an amateur station is used by that teacher as a part of classroom instruction at an educational institution.
- **Design, construction, testing, integration, on-orbit operation...**
 - **Class(es) granting credits based on the mission aspects such as those above, during the mission lifetime.**



GUIDANCE FOR FCC AMATEUR LICENSING

RELEVANT POINTS TO CONSIDER AND FULFILL

- Amateur radio is worldwide.
- Amateur radio space stations should provide two-way amateur radio communications opportunities worldwide
 - Not limited to coverage area of one or more particular ground stations
- Satellite telemetry and science data should be available to all amateur radio stations
 - Provide the means to extract the data for use by any amateur radio operator
 - (Educational component from classrooms to DIY explorers)



START EARLY

- When you decide to build a satellite, as part of the concept
- Determine whether amateur radio is what you want to do
 - Read all of the amateur radio (Part 97) regulations
 - Read the IARU requirements
 - Understand the filing process
 - Be certain that you can fulfill all of the requirements and the intended use
- If you can qualify or believe that you can qualify but have questions
 - Contact AMSAT (www.amsat.org)
- If you can qualify and support the amateur radio mission
 - Begin the coordination and licensing process as soon as you have identified a launch



CHOOSE WISELY

- If you are unable to meet all of the requirements and intended use for an amateur radio license
 - Do not attempt to make workarounds or bend the licensing to fit your system
 - Do not file and hope that the FCC will somehow allow your license
 - Determine the proper licensing you need and pursue that immediately
- Delayed or uncertain licensing puts your mission at risk of being removed from the manifest which may cost you money, i.e. to provide a mass dummy
- Delayed licensing may also affect others on your mission if payloads need to be adjusted to accommodate your failure

THE REWARDS

- An amateur radio license carries many benefits to you and to the world
 - Your telemetry is gathered by many ground stations worldwide vs. specific ground stations you license
 - Providing two-way amateur radio communication encourages amateurs to gather your telemetry as they enjoy the use and learning opportunities your satellite provides
 - Your science may continue long past the intended end of mission and the telemetry gathered may bring results beyond what was expected or planned



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