

April 9, 2020

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Notice of *Ex Parte* Presentation: **IB Docket No. 18-313**
Mitigation of Orbital Debris in the New Space Age

Dear Ms. Dortch:

On April 8, 2020, Paul Stoetzer, Executive Vice President of the Radio Amateur Satellite Corporation (AMSAT) and David Siddall, Washington Counsel to the ARRL, the National Association of Amateur Radio (ARRL) discussed by telephone the draft Report and Order in the above-referenced proceeding with Troy Tanner, Jennifer Gilsenan, Jose Albuquerque, Karl Kensinger and Merissa Velez, all of the International Bureau.

Amateur Radio has a long history in space. The first non-governmental satellite, OSCAR-1, was launched by Radio Amateurs in December 1961. A brief synopsis of AMSAT's history and achievements is attached by way of background.

Two aspects of the draft regulations are of particular concern. Adoption of those requirements would seriously hinder amateur radio's future operations in space if adopted as proposed without the relatively minor changes that we propose below.

Indemnification by Owners

The draft Report & Order would add a new paragraph (h) to § 97.207 of the Commission's regulations that would allow only private individuals to personally indemnify the United States for the operations of an Amateur space satellite. We ask that *owners* of the satellites be added to this provision.

The restriction to private individuals derives from the Amateur Radio Service rules in Part 97. The Amateur and Amateur Satellite Services are unique in that **licensees may only be individuals (§ 97.5)**. Consequently the proposed regulation would require an individual to *personally* indemnify the government for the operations of a space station. In no other service would an individual be required to personally make a similar indemnification.

Although a claim against the United States resulting from the operation of an Amateur Radio space station is unlikely, understandably it would be difficult to impossible to find an individual Amateur Radio licensee willing to personally bear that risk. Accordingly, as an alternative to the Amateur licensee, we ask that the owners of an Amateur Radio space station (which could be AMSAT or other entity) also be permitted to make the required indemnification.

The new provision including our proposed change would then read (modifications in bold):

At least 90 days prior to planned launch of the space station, the license grantee **or owner** of each space station must submit a signed statement stating that the license grantee **or owner** will be responsible for indemnifying the United States against any costs associated with a claim brought under a provision of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies or Convention on International Liability for Damage Caused by Space Objects related to the space station facilities.

Effective Date of Propulsion Requirement

The draft Report & Order would require that for “space stations deployed into the portion of the low-Earth orbit region above 400 km, the operator must certify that the space stations will be designed with the maneuvering capabilities sufficient to perform collision avoidance throughout the period when the space stations are above 400 km.” The proposed effective date of this amendment is April 23, 2022.

We do not disagree with the purpose of this requirement. While most Radio Amateur space stations currently do not include propulsion, we believe that technologies being tested in orbit and otherwise under development should make it possible for future Amateur Radio space stations intended to orbit above 400 km to include propulsion. However, the proposed effective date of April 23, 2022 is unreasonable in the case of Amateur Radio satellites.

The design and construction of Amateur Radio spacecraft generally is undertaken by volunteers and can stretch over many years. For example, although work on AMSAT’s Fox-1 CubeSat series began in 2009, the first Fox-1 CubeSat launched only in October 2015. The final CubeSat in the Fox-1 series still awaits launch and is expected no earlier than the second quarter of this year, a full eleven years after the initial work on the design began.

Accordingly, we request that for Amateur Radio satellites governed by Part 97 of the Commission’s Rules, the Commission establish in § 97.207 (g)(1)(iv)(A)(4) the more reasonable effective date of April 23, 2025. This would allow time for amateur spacecraft designers to adapt to this new requirement, including modifications required to existing designs. Unlike some commercial entities, we do not have a large number of launches. Based upon recent past years, we estimate that between the recommended 2022 date and the 2025 date only 3 - 5 new Amateur satellites are likely to be launched.

Conclusion

Builders and operators of satellites in the Amateur Satellite Service created and proved the viability and usefulness of the first small satellites. Today they continue to provide immense value in what is now a growing field of small satellites by serving as a platform for experimenters to conduct a wide variety of tests relating to the radio technique. Experiments conducted with Amateur satellites have informed and continue to inform the development of the commercial small satellite industry. Additionally, student participation in amateur satellite

projects provides both inspiration for young men and women to pursue careers in the commercial satellite industry and practical experience for those careers.

A strong and robust Amateur satellite service is in the public interest to help inspire future developments in satellite technology. Including the above two changes to the draft Report & Order will help ensure that Amateur Radio continues to have a future in space and will continue to contribute to the public interest on an educational, non-pecuniary basis.

Pursuant to Section 1.1206 of the Commission's Rules, this letter is being electronically filed in the above-referenced docket and a copy emailed to participants. Please refer any questions to Paul Stoetzer (N8HM [at] amsat.org) or David Siddall (david [at] davidsiddall-law.com).

Respectfully submitted,

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ARRL, The national association for Amateur Radio

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The Radio Amateur Satellite Corporation (AMSAT)

The Radio Amateur Satellite Corporation, or AMSAT, is a worldwide group of Amateur Radio operators chartered in the District of Columbia in 1969 as an educational organization. We design, construct, test, and operate space stations in the amateur satellite service. We also make available a variety of publications, software, educational services, and internet services promoting space science education among radio amateurs and students worldwide.

AMSAT's goal is to foster space research and communication by continuing the efforts begun by Project OSCAR, a west coast USA-based Amateur Radio group that built and launched the very first Amateur Radio satellite on December 12, 1961. The "OSCAR" satellite, "Orbiting Satellite Carrying Amateur Radio", was the first non-governmental satellite in the world. It was launched barely four years after the launch of Russia's first Sputnik at a time when only national governments were thought capable of designing, tracking, and controlling an orbiting satellite. OSCAR and AMSAT pioneered the path for today's private satellite industry.

Since launch of the first OSCAR almost 60 years ago, Radio Amateur satellites have demonstrated the public utility of the Radio Amateur Satellite Service and proven that small, relatively in-expensive satellites can perform ground-breaking scientific experiments while providing reliable communications, store-and-forward messaging, and file transfers useful for a wide variety of purposes. AMSAT's success constructing and/or operating small satellites has been a major influence on the "small satellite revolution." Its successes have led many groups to become interested in developing constellations of small satellites, including government, non-profit, and commercial organizations.

AMSAT volunteer Radio Amateur groups both in North America and elsewhere in the world have played key roles in significantly advancing the state of the art in space science, space education, and space technology. The work now being done by AMSAT volunteers throughout the world will continue to have far-reaching, positive effects on the future of governmental, scientific and commercial activities in the final frontier, as well as on Amateur Radio. Some of the major achievements of Radio Amateur communications satellites include the following.

- The AMSAT-OSCAR 6 and AMSAT-OSCAR 7 satellites validated the use of Doppler shift analysis to locate ground-based beacons, leading to the COSPAS-SARSAT beacon location system.
- AMSAT-OSCAR 6 hosted the first mobile-mobile satellite communication in any radio service. The first ground-satellite-satellite-ground communication in any radio service utilized AMSAT-OSCAR 6 and AMSAT-OSCAR 7.
- Amateur Radio operators discovered an "Inverted Doppler" anomaly at UHF frequencies by observing the 435 MHz beacon on AMSAT-OSCAR 6.
- AMSAT-OSCAR 6 experimentally relayed electrocardiogram data, demonstrating the utility of relaying medical data via satellite for the first time.

- AMSAT-OSCAR 40 carried a GPS receiver to its High Earth Orbit (HEO) and demonstrated the viability of utilizing GPS signals at altitudes above the GPS constellation. As a result of this experiment, future GPS satellites have been designed to accommodate above-constellation use.
- Widely used technologies such as battery charge regulators and HELAPS (High Efficiency Linear Amplification by Parametric Synthesis) were developed for and/or proven on AMSAT satellites.

AMSAT's current satellite programs include the Fox-1 and GOLF CubeSats. The Fox-1 program consists of a series of five CubeSats. Three Fox-1 satellites are currently in orbit with two awaiting launch. In addition to providing amateur communications services, the Fox-1 satellites carry student-built experiments from several university partners, including Vanderbilt University, Virginia Tech, the University of Iowa, and Pennsylvania State University-Erie. The GOLF program consists of a series of CubeSats designed to operate in a wide variety of orbits, including Low Earth Orbit (LEO), High Earth Orbit (HEO), and beyond. These Amateur satellites will provide new experimental platforms for Amateur Radio operators worldwide. Like the Fox-1 series, GOLF CubeSats also will carry experiments for university and other educational partners.

These satellite programs are an efficient use of both orbital and radio spectrum resources. Radio Amateur Radio operators worldwide utilize the satellite communications services while collecting telemetry and experiment data for AMSAT and its partners. In addition to its own satellite programs, AMSAT has partnered with the Husky Satellite Lab at the University of Washington to provide an amateur communications system for its HuskySat-1 CubeSat. This system provides telemetry and command capability for the satellite and communications services for the worldwide amateur radio community.

The home-brew "maker" flavor of the early Radio Amateur satellites lives on, as most of the hardware and software now flying on even the most advanced AMSAT satellites is still largely the product of volunteer effort and donated resources. Although we are fond of traditions, our designs and technology continue to push the outside of the envelope.