

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of

Application of SpaceQuest, Ltd. for an	)	
Earth Station License to Operate with	)	Call Sign:
Certain Non-Geostationary Satellite Orbit	)	File No.: SES-LIC- _____
Small Satellites	)	

APPLICATION FOR FIXED EARTH STATION LICENSE

SpaceQuest, Ltd. (“SpaceQuest”) pursuant to Section 25.115 of the Commission’s rules, 47 C.F.R. § 25.115, respectfully seeks a fixed earth station license to operate three (3) earth stations at a facility in North Pole, Alaska to communicate with certain non-geostationary satellite orbit (“NGSO”) small satellites – the AprizeSat-8 and AprizeSat-10 (together, the “AprizeSats”).¹ Specifically, SpaceQuest seeks to operate: (i) a Yagi antenna in ultra-high frequency (“UHF”) spectrum (the “UHF Yagi”); (ii) a Yagi antenna in very high frequency (“VHF”) spectrum (the “VHF Yagi”); and (iii) a receive-only 3.7m S-band antenna (the “3.7m”). The antennas currently operate pursuant to existing experimental authorizations,² and this application will permit SpaceQuest to fully commercialize its automatic identification system (“AIS”) for tracking and monitoring high-value maritime assets on vessels.³

¹ See SpaceQuest Ltd., File Nos. SAT-LOA-20210503-00058 (Call Sign S3085) and SAT-STA-20210503-00059 (the “*AprizeSat License Applications*”). The AprizeSats are the subject of pending requests for regular commercial authority and near-term special temporary authority. To the extent applicable, SpaceQuest incorporates by reference relevant satellite technical and operational information provided in the *AprizeSats License Applications*. This request is limited to the ancillary earth station operating authority only.

² See SpaceQuest, Ltd., File Nos. 0111-EX-TC-2020 (Call Sign WA2XYM), 0112-EX-TC-2020 (Call Sign WJ2XPE), and 0113-EX-TC-2020 (Call Sign WJ2XNV) (the “*Experimental Authorizations*”). To the extent applicable, SpaceQuest incorporates by reference relevant technical information included in the *Experimental Authorizations*.

³ SpaceQuest has concurrently filed earth station license applications to operate UHF Yagi and VHF Yagi antennas from its existing facilities in Naalehu, Hawaii and Fairfax, Virginia.

The UHF Yagi will operate in the 399.90-400.05 MHz (Earth-to-space) and 400.50-400.65 MHz (space-to-Earth) bands to provide primary tracking, telemetry, and command (“TT&C”) to the AprizeSats. The VHF Yagi will operate in the 145.9-146.0 MHz (Earth-to-space) band as a back-up TT&C transmit link. The 3.7m will operate in the 2300-2305 MHz (space-to-Earth) band to receive data downlinks from the AprizeSats. Grant of the authority requested herein will serve the public interest because it will directly support the development and commercial deployment of the AprizeSats, thus facilitating next-generation AIS services to the benefit of government and commercial users and furthering U.S. leadership in the advancement of satellite technologies.

I. BACKGROUND

SpaceQuest is a full-service satellite integrator and operator and has delivered on-orbit and operated over 20 satellites with diverse payloads for a variety of government agencies and commercial enterprises, including manufacturing, launching, and operating the AprizeSats. SpaceQuest was recently acquired by AAC Clyde Space AB (“AAC Clyde Space”).⁴ SpaceQuest has operated the AprizeSats for over seven years pursuant to experimental authority (as well as the associated ground stations under the *Experimental Authorizations*)⁵ with no reported cases of interference.

Grant of an earth station license will allow SpaceQuest to perform regular ground station support functions to facilitate the commercialization and success of the AprizeSats’ AIS satellite services. In addition to providing TT&C for orientation, coordination, and subsystem control, SpaceQuest also seeks to perform receive-only data downlink support for the AprizeSat using the 3.7m earth station. SpaceQuest provides the attached Technical Appendix and FCC Form

⁴ See Technical Appendix, § III.

⁵ See *Experimental Authorizations*.

312 Schedule B for information relating to the proposed earth station operations and technical parameters. As discussed herein, grant of the requested authority will serve the public interest, convenience, and necessity.

II. DISCUSSION

SpaceQuest seeks to operate the UHF Yagi in the 399.90-400.05 MHz (Earth-to-space) and 400.50-400.65 MHz (space-to-Earth) bands, and the VHF Yagi in the 145.9-146.0 MHz (Earth-to-space) band, to provide TT&C support for the AprizeSats. SpaceQuest will also operate the 3.7m earth station in the 2300-2305 MHz (space-to-Earth) band to support data downlink from the AprizeSats. Operations will be conducted as needed to communicate with the AprizeSats as they pass over the North Pole earth station (several times per day for brief periods of approximately 8 minutes). Grant of this request is critical for the long-term commercial viability of the AprizeSats and will ensure the satellites have established earth station support in the United States. SpaceQuest will work with Commission staff and other U.S. government agencies as needed to ensure that these operations will not increase the potential interference to current or future government users and that the interests of the United States are fully accommodated.

A. AprizeSats Mission Overview

The AprizeSats operate in polar, sun-synchronous orbits – AprizeSat-8 is deployed at 626 km and AprizeSat-10 is deployed at 678 km. There are two communication systems on board each of the AprizeSats, specifically the TT&C system and the AIS mission system. The primary operating mode for the TT&C system includes receiving ground commands and new flight code on either the VHF or UHF frequencies sought herein, processing and executing commands, collecting and storing telemetry, and downlinking telemetry data on request. The AIS mission system also includes the collection of AIS messages, message processing, storage, and satellite transmission to

the 3.7m earth station. Below, SpaceQuest provides an overview of its proposed earth station spectrum use while supporting the AprizeSats.

B. UHF Spectrum Use

The United States Table of Frequency Allocations (“Table of Allocations”), Section 2.106 of the Commission’s rules, 47 C.F.R. § 2.106, provides that the 399.9-400.05 MHz band is shared on a co-primary basis between mobile-satellite service (Earth-to-space) and radionavigation-satellite services. Moreover, the Table of Allocations provides that the 400.5-400.65 MHz band is shared between meteorological aids (Earth-to-space), mobile-satellite service (space-to-Earth), space research (space-to-Earth) and space operation services (space-to-Earth). In the 400.5-400.65 MHz band, SpaceQuest will perform TT&C operations in these bands consistent with its co-primary allocation in each band.⁶

SpaceQuest acknowledges that there are certain U.S. government meteorological aids and space research operations conducted in the 399.90-400.05 MHz band⁷ and 400.5-400.65 MHz band.⁸ Moreover, to the extent that expanded Federal use of the subject bands is contemplated, SpaceQuest will work with Commission staff to ensure that its proposed operations do not increase the potential interference to current or future government users and are compatible with Federal operations.

SpaceQuest has performed experimental operations at the North Pole facility for the lifetime of the AprizeSats without an interference incident to date. SpaceQuest will conduct its

⁶ See 47 C.F.R. § 2.1 (defining “space research services” as “a radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes.”); 47 C.F.R. § 2.106, US320 (“the use of the band 400.15-401 MHz by the mobile-satellite service is limited to non-voice, non-geostationary satellite systems and *may include satellite links between land earth stations at fixed locations* [emphasis added].”).

⁷ See https://www.ntia.doc.gov/files/ntia/publications/compendium/0399.90-0400.05_01MAR14.pdf.

⁸ See https://www.ntia.doc.gov/files/ntia/publications/compendium/0400.15-0401.00_01MAR14.pdf.

TT&C operations on a non-harmful interference basis and, if it learns that its operations are causing harmful interference to other authorized operations, SpaceQuest will modify or suspend operations to immediately resolve such interference.

C. VHF Spectrum Use

The Table of Frequency Allocations provides that the 145.9-146 MHz band is shared on a co-primary basis between amateur radio and amateur-satellite service. Accordingly, SpaceQuest respectfully requests a waiver to operate the VHF Yagi in the 145.9-146.0 MHz (Earth-to-space) to provide back-up TT&C. The proposed backup TT&C operations are for emergency control transmissions only and, therefore, the band will rarely, if ever, be used.

While the Commission's rules provide that this band is intended for non-commercial operations it is also intended for the "[c]ontinuation and extension of the amateur's proven ability to contribute to the advancement of the radio art."⁹ SpaceQuest has performed backup TT&C operations for the entire experimental lifetime of the AprizeSats with no reported cases of interference. Accordingly, as discussed below, a waiver of the Commission's rules is appropriate in this context.

D. S-band Spectrum Use

The Table of Frequency Allocations provides that the 2300-2305 MHz band is allocated on a primary basis to amateur radio. Accordingly, SpaceQuest respectfully requests a waiver to operate the 3.7m earth station in the 2300-2305 MHz band. Considering SpaceQuest has operated the AprizeSats in this band to date without interference, a waiver to permit downlink to the North Pole facility is necessary and appropriate to provide regular service to federal government and

⁹ See 47 C.F.R. § 97.1(b).

commercial customers.¹⁰ The spectrum sharing impact of the SpaceQuest’s operations in this band is negligible given it is a single, receive-only ground station in a remote location of Alaska. Still, SpaceQuest requests a waiver of the Commission’s rules below to permit this non-conforming use.

III. WAIVER REQUESTS

The Commission may waive its rules for “good cause shown.”¹¹ In considering requests for non-conforming spectrum uses, the Commission has indicated that it would generally grant such waivers “when there is little potential for interference into any service authorized under the U.S. Table of Frequency Allocations (“Table of Frequency Allocations”) and when the non-conforming operator accepts any interference from authorized services.”¹² SpaceQuest respectfully seeks a waiver of Section 2.106 of the Commission’s rules, 47 C.F.R. § 2.106, to the extent necessary to operate the 400 MHz Yagi in the 145.9-146.0 MHz (Earth-to-space) band, and to operate the 3.7m earth station in the 2300-2305 MHz (space-to-Earth) band.

In the *Smallsat Order*, the Commission anticipated applications regarding experimental operations that transition to commercial operations and that “in some instances . . . may request operations not consistent with the current International Table of Allocations.”¹³ Indeed the Commission explicitly remarked that “[t]here may be cases where . . . an operator is using

¹⁰ SpaceQuest requested an appropriate waiver for the AprizeSats to operate in the 2300-2305 MHz downlink band in the *AprizeSat License Applications*.

¹¹ See 47 C.F.R. § 1.3. *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

¹² See *Fugro-Chance, Inc., Order and Authorization*, 10 FCC Rcd 2860 ¶ 2 (IB 1995) (authorizing nonconforming MMSS in the C-band); see also *Motorola Satellite Communications, Inc., Order and Authorization*, 11 FCC Rcd 13952 ¶ 11 (IB 1996) (authorizing service to fixed terminals in bands allocated to the mobile satellite service); *Hughes Network Systems, LLC, Declaratory Ruling*, 26 FCC Rcd 8521 ¶¶ 12-14, n. 1 (IB 2011); *Boeing Company, Order and Authorization*, 16 FCC Rcd 5864 ¶¶ 8-9, 12 (IB and Office of Engineering and Technology 2001).

¹³ See *Streamlining Licensing Procedures for Small Satellites, Report & Order*, Docket No. 18-86, FCC 19-81 (rel. Aug. 2, 2019) (“*Smallsat Order*”) ¶ 115.

equipment that has been shown to successfully operate on a non-interference basis under a previous experimental license or licenses.”¹⁴ The VHF Yagi and 3.7m earth station have a demonstrated history of non-interference in their operating bands and SpaceQuest will otherwise comply with applicable rules to ensure operations continue on a non-interference basis. Accordingly, grant of the requested waivers would serve the public interest.

Operations in the 145.9-146.0 MHz (Earth-to-space) band would be for backup TT&C only and therefore would only be used in the event that the UHF Yagi receiver failed. To date, SpaceQuest’s VHF TT&C operations have not caused harmful interference to incumbent operators and will rarely be used. Moreover, good cause also exists to grant a waiver to provide AIS data downlink in the 2300-2305 MHz frequency band. The Commission previously granted SpaceQuest authority to operate in the band on an experimental basis and there is no potential for interference from the 3.7m earth station into other spectrum users as it will perform receive-only operations. Considering the foregoing, a waiver of the rule is appropriate as no harmful interference is likely to occur. Moreover, a waiver to continue operations in these bands is necessary to provide service to federal government and commercial customers.

IV. PUBLIC INTEREST CONSIDERATIONS

Grant of the authority requested herein will serve the public interest because it will directly support the development and commercial deployment of the AprizeSats, thus facilitating next-generation AIS services to the benefit of government and commercial users and furthering U.S. leadership in the advancement of satellite technologies. Earth station operations have been ongoing for years under the *Experimental Authorizations*, and regular authority to support the AprizeSats’ from SpaceQuest’s existing ground station facility will facilitate improved maritime operations and vessel awareness services.

¹⁴ *Id.*

V. CONCLUSION

Based on the foregoing, SpaceQuest respectfully requests that the Commission grant its earth station license application, including the waivers requested herein, to provide TT&C and data downlink services for the AprizeSats from its facility in North Pole, Alaska.