

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

In the Matter of)	
)	
Application of RBC Signals LLC for a 180- Day Special Temporary Authorization to)	Call Sign:
Provide Earth Station Support for U.S.- Licensed Experimental Satellites)	File No.: SES-STA-

REQUEST FOR SPECIAL TEMPORARY AUTHORITY

RBC Signals LLC (“RBC Signals”), pursuant to Section 25.120 of the Commission’s rules, respectfully seeks a 180-day special temporary authorization (“STA”) to operate a 4.5m Orbit Gaia-100 (the “4.5m”) earth station at its existing facility in Deadhorse, Alaska, to provide limited data uplink and downlink support for two U.S.-licensed, non-geostationary satellite orbit (“NGSO”) cubesats – the BRIO and THEA satellites – operated by SpaceQuest, Ltd. (“SpaceQuest”).¹ RBC Signals seeks to operate the 4.5m earth station in the 2200-2202 MHz (space-to-Earth) and 2045-2046 MHz (Earth-to-space) bands to downlink experimental test data and upload critical firmware to the payload. Grant of this request will strongly serve the public interest by ensuring a successful mission for these novel, U.S.-licensed spacecraft by providing reliable western hemisphere ground station support.

I. DISCUSSION

RBC Signals seeks to support the SpaceQuest spacecraft using a 4.5m earth station at its existing site in Deadhorse, Alaska, where it currently provides telemetry, tracking and command (“TT&C”) support for the SpaceQuest spacecraft in the 400.50-400.65 MHz (space-to-Earth) and

¹ See SpaceQuest, Ltd., File No. 0176-EX-CN-2018, Call Sign WJ2XNV; *see also* SpaceQuest, Ltd., File No. 0220-EX-CN-2018, Call Sign WJ2XPE (collectively, the “SpaceQuest Licenses”).

399.90-400.05 MHz (Earth-to-space) bands.² Here, RBC Signals seeks to provide short-term service link support using only one megahertz of bandwidth in each direction per satellite from 2200-2202 MHz³ (space-to-Earth) and 2045-2046 MHz (Earth-to-space). RBC Signals has concurrently filed a request for 60-day STA to permit near-term operations while this application is placed on public notice. As demonstrated in the following sections, RBC Signals' proposed operations will not increase the potential for interference into existing Federal and non-Federal operations in these bands.

RBC Signals provides the attached Technical Appendix, which includes a radiation hazard analysis, frequency coordination report and draft FCC Form 312 Schedule B for information relating to the proposed earth station operations. In addition, RBC Signals incorporates by reference the technical information submitted by SpaceQuest in support of the experimental licenses granted by the Commission for the BRIO and THEA spacecraft.⁴ As discussed below, grant of the requested STA will serve the public interest, convenience, and necessity.

A. Satellite Overview & Earth Station Support

The BRIO and THEA satellites are 3U cubesats, each with a mass of approximately 5 kg. BRIO and THEA were launched on November 19, 2018, on the SSO-A mission from Vandenberg Air Force Base in California.⁵ The satellites operate in a circular, sun-synchronous orbit at 575

² See RBC Signals, LLC, File Nos. SES-STA-20181115-03264, SES-STA-20181115-03265, SES-STA-20190129-00053 and SES-STA-20190129-00055 (current through June 30, 2019).

³ Access to the 2200-2202 MHz downlink band will allow RBC Signals to offset the frequency channels for THEA and BRIO (*i.e.*, THEA has a center frequency of 2200.50 MHz and BRIO has a center frequency of 2201.50 MHz), but each spacecraft will use a one megahertz emission bandwidth at any given time.

⁴ See SpaceQuest Licenses.

⁵ See <http://spaceflight.com/sso-a/>.

km with an inclination from the equator of 97.52°. The expected mission lifetime of the satellites is five years.⁶

The BRIO and THEA satellites are operated by SpaceQuest, which recently received experimental licenses for their operation.⁷ The primary mission of the BRIO satellite is to investigate, identify and resolve potential technical and implementation issues with SpaceQuest's advanced software-defined radio ("SDR") satellite design. The primary mission of the THEA satellite is to test experimental payloads from U.S.-based Aurora Insight to validate the ability of its flight computer firmware to monitor, process, and generate relevant measurements using a novel wideband antenna.

The SpaceQuest Licenses indicate a grant of authority for a number of associated ground stations to communicate with the BRIO and THEA satellites. To date, however, SpaceQuest does not have Commission authority to operate a U.S. earth station to provide support in the 2200-2202 MHz and 2045-2046 MHz bands. For this reason, SpaceQuest seeks service link support from RBC Signals' earth station facility in Alaska, which is already collocated and can be activated immediately to support the spacecraft.

RBC Signals seeks to provide immediate mission data support for BRIO and THEA and, pending the success of the earth station operations, potentially longer-term support for the mission life. The proposed operations are important to assess spectrum data to minimize uncertainty and optimize performance in anticipation of commercial operations. It is especially important to be able to provide service link support for early mission operations to assess program and software-related issues.

⁶ As noted, RBC Signals is working with the Commission staff to develop appropriate approaches to ensure longer-term authority for operations during this mission period.

⁷ See SpaceQuest Licenses.

RBC Signals' operations will be conducted on an unprotected and non-interference basis intermittently and as-needed approximately two or three times per day when the satellites pass over the earth station. RBC Signals will conduct these operations in accordance with the Commission's rules and interagency requirements governing fixed earth station operations in the subject bands. In addition, RBC Signals expressly acknowledges that any grant of this STA request is without prejudice to Commission action on other requests for authority to provide support for the SpaceQuest satellites. Below, RBC Signals addresses spectrum related issues relating to its proposed operations.

B. Uplink Operations

The Table of Allocations provides that the 2025-2110 MHz band is allocated on a primary basis to non-Federal terrestrial fixed and mobile services. Earth exploration satellite services ("EESS") and space research operations are also permissible in this band on a case-by-case basis and transmissions must operate on a non-interference basis with Federal and non-Federal users of the band.⁸ RBC Signals proposes to operate the 4.5m earth station in the 2045-2046 MHz band to provide mission data uplink support for the SpaceQuest spacecraft consistent with the Commission's Table of Allocations.⁹

RBC Signals understands that there are certain U.S. government operations conducted in the 2025-2110 MHz band, including use by National Aeronautics and Space Administration ("NASA").¹⁰ RBC Signals will coordinate with NASA to ensure compatibility of the proposed

⁸ See 47 C.F.R. § 2.106, fn.US347.

⁹ 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.").

¹⁰ See https://www.ntia.doc.gov/files/ntia/publications/compendium/2025.00-2110.00_01MAR14.pdf.

downlink transmissions, in particular, with the International Space Station operations. RBC Signals is unaware of any additional, near-term interference concerns with the proposed uplink operations.

Based on our research and consultation with the relevant government agencies to date and given RBC Signals only seeks to perform transmit operations in one megahertz of spectrum per satellite from 2045-2046 MHz, RBC Signals has not identified any conflicting Federal operations and believes the proposed operations will not present a potential for interference to other spectrum users of the band. RBC Signals will operate on an unprotected, non-interference basis and, if it learns that its operations are causing harmful interference to other operations, it will suspend or modify its operations to resolve such interference.

1. Frequency Coordination

RBC Signals engaged Micronet to perform frequency coordination analysis for the 4.5m earth station, which was completed on January 2, 2019. Pursuant to Sections 25.115(c)(2)(ii) and 25.203 of the Commission's rules, 47 C.F.R. §§ 25.115(c)(2)(ii) and 25.203, Micronet has conducted a coordination analysis on behalf of RBC Signals that considers all existing, proposed and prior coordinated microwave facilities within the contours of the 4.5m earth station at the Deadhorse facility.

As demonstrated in the attached frequency coordination report, there is no potential for interference between other users of the S-band spectrum and the operations of the 4.5m earth station at the Deadhorse facility,¹¹ and RBC Signal's proposed operations are fully compatible with other FCC-licensed operations in the band. There are no unresolved interference objections

¹¹ Although RBC Signals will only operate using a 1 MHz bandwidth emission, out of an abundance of caution, it coordinated the entire S-band uplink from 2025-2110 MH

and Micronet has concluded that no unacceptable interference will result with other operations in the band.

C. Downlink Operations

RBC Signals seeks to provide data downlink support for the SpaceQuest spacecraft in the 2200-2202 MHz band. The Table of Allocations provides that the 2200-2290 MHz band may be used for Federal EESS, space operations, and space research with no allocation for non-Federal uses.¹² RBC Signals acknowledges that this band is used by Federal agencies for diverse satellite and terrestrial applications, including the Tracking and Data Relay Satellite System (“TRDSS”),¹³ but there does not appear to be any incompatibility issues. Accordingly, when operating the 4.5m earth station in the 2200-2290 band for data downlink operations, RBC Signals intends to operate the earth station on a non-conforming (unprotected and non-interference) basis. As discussed below, RBC Signals respectfully requests a waiver of the Table of Allocations, 47 C.F.R. §2.106, to the extent necessary to permit its non-conforming use of the 2200-2202 MHz band.

Given the remote location of RBC Signal’s earth station operations (the North Slope of Alaska), RBC Signals is highly confident it can operate the 4.5m earth station without causing harmful interference to authorized spectrum users and agrees to accept any harmful interference from Federal stations while operating on a non-conforming, unprotected basis. In addition, RBC Signals’ use of this band will be limited to intermittent receive operations in one megahertz of spectrum per satellite at any given time, and thus RBC Signals’ receive-only operations would not

¹² Non-federal operations are limited to Tracking and Data Relay Satellite System (“TRDSS”) transmissions. *See* 47 C.F.R. §2.106, fn. US303.

¹³ *See* <https://www.ntia.doc.gov/files/ntia/publications/compendium/2200.00-2290.00-01MAR14.pdf>.

cause interference to other spectrum users. At all times, RBC Signals will not claim protection from Federal uses of the 2200-2290 MHz band while operating.

D. Waiver Request

RBC Signals respectfully seeks a waiver of Section 2.106 of the Commission's rules, 47 C.F.R. § 2.106, to permit operation of the 4.5m earth station in the 2200-2202 MHz band to provide mission downlink support for the SpaceQuest spacecraft. The Table of Allocations provides that the 2200-2290 MHz band may be used for Federal EESS, space operations, and space research with no allocation for non-Federal uses (non-federal operations are limited to TRDSS transmissions).¹⁴ The Commission may waive its rules for "good cause shown."¹⁵ In general, good cause exists if grant of a waiver would not undermine the purposes of the rule and would otherwise serve the public interest.¹⁶

In this case, a waiver is warranted because there is no material potential for interference from the proposed receive-only operations. RBC Signals limited operations will occur only when the satellite is within view of the relevant earth station for brief periods of time and will only utilize proposed 1 MHz of spectrum to communicate with each satellite. Moreover, the remote location of the facility (on the North Slope of Alaska) and lack of nearby Federal earth stations greatly limit the potential for interference from the proposed operations. RBC Signals will operate without causing harmful interference to authorized spectrum users and agrees to accept any harmful interference from Federal stations while operating on a non-conforming, unprotected basis. Thus,

¹⁴ See 47 C.F.R. §2.106, fn. US303.

¹⁵ See 47 C.F.R. § 1.3. *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

¹⁶ See *id.*

grant of the requested waiver is appropriate and RBC Signals commits to working with Federal agencies to coordinate use of the band as necessary.

E. STA Request & Public Interest Considerations

RBC Signals respectfully seeks this 180-day STA pursuant to Section 25.120(b)(2) of the Commission's rules, 47 C.F.R. § 25.120(b)(2). A 180-day STA is appropriate because RBC Signals does not plan to file an application for a long-term earth station license (i.e., a 15-year term).¹⁷ Moreover, RBC Signals has concurrently filed a request for 60-day STA to allow near-term operations during the public notice period and, consistent with Commission practice, RBC Signals requests that the Commission grant this STA request with the proposed commencement date at the earliest practicable time.

Grant of this STA request is in the public interest because (i) SpaceQuest has no existing earth station facilities that can provide essential service link support for their satellites; (ii) grant will facilitate the safe operation of the SpaceQuest satellites by ensuring up-to-date firmware and mission optimization; (iii) it will promote U.S. leadership in the development of next-generation satellite technologies being tested by the SpaceQuest satellites; and (iv) grant will also facilitate U.S. leadership in earth station services by enabling RBC Signals to provide critical service link support for the SpaceQuest missions.

II. Conclusion

In view of the foregoing, the public interest would be served by a grant of a 180-day STA at the earliest practicable time to allow RBC Signals to provide earth station support for the

¹⁷ Based on consultation with Commission staff and other relevant government agencies, RBC Signals understands that a long-term earth station license is not suitable for the proposed operations. Moreover, the mission life of the SpaceQuest spacecraft (only 5 years from launch) does not warrant long-term commercial earth station license authority for the proposed operations. Consistent with past practice regarding STA authority for time-limited earth station operations, RBC Signals intends to request renewals of this 180-day STA to ensure appropriate Commission authority for the life of the mission.

SpaceQuest spacecraft in the 2200-2202 MHz (space-to-Earth) and 2045-2046 MHz (Earth-to-space) bands using the 4.5m earth station from its existing facility in Deadhorse, Alaska.