

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

In the Matter of

Application of RBC Signals, LLC for an	)	Call Sign:
Earth Station License to Operate with	)	File No.: _____
Non-Geostationary Orbit Space Stations	)	

**APPLICATION FOR FIXED EARTH STATION LICENSE
(S-band 3.7m Antenna Uplink – Deadhorse, Alaska)**

RBC Signals, LLC (“RBC Signals”), pursuant to Section 25.115 of the Federal Communications Commission’s (“FCC” or “Commission”) rules, 47 C.F.R. § 25.115, respectfully seeks an earth station license to operate a fixed 3.7-meter S-band earth station in Deadhorse, Alaska (the “3.7m Earth Station”) to conduct telemetry, tracking, and command (“TT&C”) uplink operations in portions of the 2025-2110 MHz (Earth-to-space) band with certain non-geostationary orbit (“NGSO”) space stations.

Specifically, RBC Signals seeks to support the Sherpa-AC1¹ and Sherpa-LTE1² spacecraft operated by Spaceflight, Inc. (“Spaceflight”), and the Mandrake spacecrafts Able and Baker³ operated by the Defense Advanced Research Projects Agency (“DARPA”), using 300 kilohertz emissions at center frequencies: 2046 MHz, 2048 MHz, 2050 MHz, 2053 MHz, 2056 MHz, and 2075 MHz). RBC Signals also seeks to support the Vigoride-5 (“VR-5”) spacecraft (with a 100 kilohertz emission at center frequency 2075 MHz), operated by Momentus Space

¹ See Spaceflight, Inc., File No. SAT-LOA-20220111-00007, Call Sign S3133 (granted May 10, 2022) (“*Sherpa-AC1 Application*”); see also See RBC Signals, LLC, File Nos. SES-STA-20220509-00470 (granted May 25, 2022) and SES-STA-20220621-00681 (granted Nov. 9, 2022).

² See SpaceFlight, Inc., File No. SAT-STA-20210205-00017 (granted May 28, 2021) (“*Sherpa-LTE1 STA*”); see also RBC Signals LLC, File Nos. SES-STA-20210420-00724 (granted June 29, 2021) and File No. SES-STA-20210723-01269 (granted Oct. 4, 2022).

³ See RBC Signals, LLC, File No. 0956-EX-ST-2022, Call Sign WT9XYB (granted June 25, 2022) (“*Mandrake STA*”); see also <https://www.darpa.mil/news-events/2021-07-07>.

LLC (“Momentum”),⁴ as well as the Rapid Revisit Optical Cloud Imager (“RROCI”) satellite operated by Orion Space Solution, LLC (“Orion Space”)⁵ (with a 128 kilohertz emission at center frequency 2085 MHz).⁶

The earth station operations proposed herein are the subject of a concurrently filed request for special temporary authorization (“STA”). In addition, similar operations have been authorized from RBC Signals’ 4.5-meter earth station (the “4.5m Earth Station”), and 6.0-meter earth station (the “6.0m Earth Station”),⁷ which are located nearby in Deadhorse, Alaska.

RBC Signals will conduct all operations in accordance with the Commission’s rules and requirements. RBC Signals is attaching Form 312 Schedule B, and incorporates by reference the operational specifications included in the authorizations of the subject spacecraft.⁸ As demonstrated in this application, the earth station license requested herein will serve the public interest because it will allow RBC Signals additional diversity in supporting multiple satellite operations.

I. BACKGROUND

RBC Signals is a Seattle, Washington-based company providing innovative earth station services in the United States and around the world both to U.S. government and commercial clients. RBC Signals has a contract with the U.S. Department of Defense’s (“DoD”) Space

⁴ See Momentum Space LLC, File Nos. SAT-LOA-20220504-00047 and SAT-AMD-20220729-00075, Call Sign S3144 (granted November 15, 2022) (VR-5).

⁵ See Orion Space Solutions, LLC, Experimental License Call Sign WM2XEU, Application File No. 0867-EX-CN-2021 (granted August 2, 2022).

⁶ RBC Signals will remove each of these satellites as an authorized point of communication upon the completion of their missions.

⁷ See RBC Signals, Call Sign E220185, SES-STA-20220929-01060 (granted November 28, 2022). See also pending applications File Nos. SES-LIC-20221121-01273, and SES-STA-20221014-01134.

⁸ RBC requests leave to update the technical or operational data associated with this application request should the Commission seek any clarifying or supplemental information in considering this request.

Development Agency (“SDA”) to provide ground station support for SDA Tranche 0 satellite operations from the 4.5m Earth Station, and an STA for the 6.0m Earth Station to provide TT&C support for Sherpa-AC1, Sherpa-LTE1, and the Mandrake spacecrafts Able and Baker. RBC Signals has been operating the 4.5m Earth Station and 6.0m Earth Station a short distance from the proposed site for the 3.7m Earth Station, using the same powers levels and emissions. No harmful interference has resulted from those operations, and none is anticipated from the proposed operations of the 3.7m Earth Station. RBC Signals will continue to ensure that its TT&C operations will not cause harmful interference to current or future co-frequency operations and that the interests of the United States are accommodated.

II. DISCUSSION

To accommodate ongoing U.S. government and commercial needs, and to allow for more efficient and flexible operations at its Deadhorse, Alaska, facility over the long term, RBC Signals is constructing a new earth station using a Cobham Tracker 3700 antenna system.⁹ The 3.7m Earth Station is placed in an area with restricted access, and it meets the requirements of 47 C.F.R. § 25.115(p).

RBC Signals seeks to provide TT&C uplink communications using the 3.7m Earth Station in portions of the 2025-2110 MHz (Earth-to-space) band to support the Spaceflight Sherpa-LTE1 spacecraft, the Sherpa-AC1 spacecraft, the Mandrake Able and Baker satellites, the VR-5 spacecraft, and the RROCI satellite, as described below. RBC Signals is constructing this additional earth station to complement its existing operations, allowing it to provide more reliable service to its satellite customers from ground stations in Deadhorse, Alaska. These

⁹ The proposed 3.7m Earth Station is located at 70° 11’ 27.0234” N, 148° 26’ 6.7842” W. RBC Signals 4.5m Earth Station is located at 70° 12’ 45” N, 148° 24’ 39” W. The 6.0m Earth Station is located at 70° 12’ 42” N, 148° 24’ 43” W.

ground station operations are in great demand because the high latitude of Deadhorse, Alaska means that the satellites will pass over the location frequently. For RBC Signals to provide effective support for these satellites, it needs to have additional earth station capacity. The proposed 3.7 meter ground station will operate with the same equivalent isotropically radiated power (“EIRP”) as the existing 4.5 meter and 6.0 meter ground stations, to provide the same service to the satellites.

A. Summary of Frequency Use

In Table 1 below, RBC Signals presents information on the frequencies currently approved for use by the 4.5m Earth Station and 6.0m Earth Station. This application seeks to authorize these same operations by the 3.7m Earth Station.

Table 1 - Summary of Frequency Use

Satellite	Center Frequencies	Emission Designator
Sherpa-AC1	2046 MHz	300KG1D
	2048 MHz	300KG1D
	2050 MHz	300KG1D
	2053 MHz	300KG1D
	2056 MHz	300KG1D
	2075 MHz	300KG1D
Sherpa-LTE1	2075 MHz	300KG1D
Mandrake Able	2075 MHz	300KF1D
Mandrake Baker	2075 MHz	300KF1D
VR-5	2075 MHz	100KG1D
RROCI	2085 MHz	128KG1D

B. Satellite Overviews

1. Sherpa-AC1

The Sherpa-AC1 satellite was previously approved by the Commission,¹⁰ and RBC Signals incorporates by reference the Sherpa-AC1 mission information and payload

¹⁰ See *supra* n.1.

specifications provided in the Sherpa-AC1 Application. Sherpa-AC1 is a NGSO deployment vehicle operated by Spaceflight, which has already deployed seven spacecraft into Sun-synchronous orbit (“SSO”). Two additional payloads are permanently affixed to the Sherpa-AC1 spacecraft: NearSpace Launch’s TROOP-3 payload and Xona Space System’s navigational payload. Under call sign E220056, RBC Signals was authorized to operate 300 kilohertz carriers with center frequencies at 2046 MHz, 2048 MHz, 2050 MHz, 2053 MHz, 2056 MHz, and 2075 MHz to provide TT&C support for the Sherpa-AC1 from the 4.5m Earth Station.¹¹ STA authority for similar operations with Sherpa-AC1 was granted to RBC Signals from its 6.0m Earth Station.¹² RBC Signals herein requests to communicate with Sherpa-AC1 at these same frequencies and the same EIRP from the 3.7m Earth Station.

2. Sherpa-LTE1

The Sherpa-LTE1¹³ is an NGSO deployment vehicle with a secondary mission to enable two new modular systems to demonstrate control and propulsive elements, rapidly deorbit the vehicle, and collect data for future missions. Sherpa-LTE1 is in SSO with nominal orbit altitude of 525 km (based upon a range of SSO orbit altitudes from 500km to 550km) with an inclination of 97.6°.

RBC Signals was authorized to provide critical mission support for Spaceflight’s evaluation of the Sherpa-LTE1 controlled deorbiting technology by providing a backup link for the Sherpa-LTE1 using a 300 kilohertz carrier with a center frequency at 2075 MHz from the 4.5m Earth Station.¹⁴ STA authority for similar operations with Sherap-LTE1 was granted to

¹¹ *See id.*

¹² *See* RBC Signals, Call Sign E220185, SES-STA-20220929-01060 (granted November 28, 2022).

¹³ *See supra* n. 2.

¹⁴ *See id.*

RBC Signals from its 6.0m Earth Station.¹⁵ RBC Signals will operate the 3.7m Earth Station at the same frequency with the same EIRP as is authorized in both STAs.

3. Mandrake Able and Baker

RBC is also seeking authority to provide TT&C uplinks for two Mandrake NGSO satellites being operated by DARPA as part of the Blackjack program. The Blackjack program is exploring inter-satellite communications using laser links. The Mandrake satellites travel in a formation, and they are in the same orbit. They are near enough to one another that they will pass over the ground station simultaneously.

RBC Signals was authorized to provide scheduling interface, antenna control and pointing, and radio configuration control for Mandrake Able and Baker under an FCC experimental license, call sign WT9XYB.¹⁶ The satellites pass over the transmit station in Deadhorse, Alaska approximately 10-12 times each day, with each pass lasting approximately 10-12 minutes. RBC Signals' TT&C operations use the center frequency of 2075 MHz with an EIRP of 25.68 kW.¹⁷ RBC Signals was granted STA authority to communicate with Able and Baker from the 6.0m Earth Station using 300 kilohertz emissions at center frequencies: 2046 MHz, 2048 MHz, 2050 MHz, 2053 MHz, 2056 MHz, and 2075 MHz.¹⁸

¹⁵ See *supra* n. 14.

¹⁶ See *supra* n.3

¹⁷ The EIRP of the signal from the 4.5m Earth Station is 25.68 kW or 44.095 dBW. That will remain the same at the 3.7m Earth Station.

¹⁸ See *supra* n. 14.

4. Vigoride-5

VR-5 is an NGSO spacecraft designed to transport and deploy customer payloads in LEO, as well as to permanently host experimental customer operations. Propelled primarily by a novel microwave electrothermal thruster, a non-toxic and low-pressurized water propellant system capable of providing orbit transfers, VR-5 will transport a total of five (5) third-party payloads. Four of the five payloads are Momentus's customer cubesats, which will be deployed directly from VR-5 shortly after it is injected into orbit. The fifth payload is an experimental light-weight flexible phased array system designed by the California Institute of Technology's High-Speed Integrated Circuits Group ("Caltech"). This payload will remain on board the VR-5 satellite and will be operated by Caltech in cooperation with Momentus. RBC Signals incorporates by reference the VR-5 mission information and payload specifications provided in the VR-5 application.¹⁹

5. RROCI

RROCI²⁰ is a 12U NGSO satellite which has been designed to incorporate multiple cameras with a satellite downlink and an electronic propulsion system. RROCI will be orbiting the Earth in SSO and capturing still imagery at a rapid framerate.

Orion Space currently holds a subcontract to conduct a demonstration for the U.S. Air Force and Space Force of how RROCI can improve in-theater weather imagery over the currently available technologies. RROCI's novel approach to cloud imagery is expected to improve flight safety for DoD personnel. At the end of the mission, Orion Space will send

¹⁹ See *supra* n.4. Momentus expects that it will have, as a minimum, between four to five passes per day over the ground stations. Each communication window presents an average of approximately seven minutes contact time.

²⁰ See *supra* n. 5.

commands to RROCI to begin its deorbit process. Orion Space is initially planning to operate the RROCI satellite for a year after launch in December 2022, but holds a 2-year experimental license to allow for ongoing operations should the DoD choose to extend the contract.

C. Frequency Allocations and Frequency 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 2025-2110 MHz band is allocated on a primary basis to non-Federal terrestrial fixed and mobile services. Non-federal Earth-to-space transmissions may be authorized on a case-by-case basis for space research and Earth exploration-satellite services (“EESS”), so long as such operations are conducted on a non-interference basis with Federal and non-Federal users of the band.²¹ RBC Signals will operate these links on a non-interference basis, as required by the Table of Allocations.

The Table of Allocations also provides that the 2025-2110 MHz band is allocated on a primary basis to space operations, EESS, and space research. In the United States, space operations are limited to federal operators, and EESS use by commercial operators is subject to conditions as may be applied on a case-by-case basis and the limitation that any use may not cause harmful interference to authorized operations. RBC Signals understands that there are certain U.S. government operations conducted in the 2025-2110 MHz band, including use by the National Aeronautics and Space Administration (“NASA”).²² RBC Signals will continue its coordination efforts with NASA and other government agencies to ensure compatibility of the proposed operations.

²¹ See 47 C.F.R. § 2.106, fn. US347.

²² See https://www.ntia.doc.gov/files/ntia/publications/compendium/2025.00-2110.00_01MAR14.pdf.

D. Frequency Coordination and Interference

RBC Signals has engaged Micronet to perform a new frequency coordination that considers all existing, proposed, and prior-coordinated terrestrial microwave and other facilities within the contours of the 3.7m Earth Station. The final coordination report from Micronet for the 3.7m Earth Station is still pending; however, the coordination reports which supported the 4.5m Earth Station and 6.0m Earth Station authorizations show no interference cases. RBC Signals also understands that the satellite operators have coordinated access to the required frequencies for their respective operations. A radiation hazard report for the 3.7m Earth Station is attached as Exhibit 1.

RBC Signals notes that it has operated in the subject spectrum using the 4.5m Earth Station and 6.0m Earth Station without any harmful interference incidents. The proposed operations of the 3.7m Earth Station are not expected to create any increased risk of interference, and RBC Signals has not identified any conflicting Federal or commercial operations.

Nonetheless, RBC Signals will operate its S-band transmitter 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. RBC Signals is confident that there is no potential for interference between other users of this spectrum and the operations of the 3.7m Earth Station.

E. Waiver Request

To the extent necessary, RBC Signals requests waiver of the Table of Allocations to permit the proposed TT&C transmit operations in the 2025-2110 MHz band. Specifically, a waiver may be appropriate to the extent the Commission concludes that any of the proposed operations do not conform to the available non-Federal allocations in the band.

The Commission may waive any of its rules for “good cause” shown.²³ In general, waiver is appropriate if (i) special circumstances warrant a deviation from the general rule; and (ii) such deviation would better serve the public interest than would strict adherence to the rule.²⁴ Special circumstances justify grant of the requested waivers and grant will not undermine the policy objectives of the rules and will otherwise serve the public interest.

Given RBC Signals’ limited spectrum use, prior use of the same frequencies for the same operations using the 4.5m Earth Station and 6.0m Earth Station without interference incident, and successful coordination of these frequencies, the public interest would be served by permitting the 3.7m Earth Station to support the operations of the satellites identified herein. RBC Signals will continue to ensure that its earth station transmit operations do not increase the potential for interference into current or future U.S. government or commercial users. RBC Signals therefore respectfully requests, if a waiver is needed, that it be granted by the Commission.

F. Public Interest Consideration

RBC Signals is at the forefront of reinventing TT&C and earth station support solutions and grant of the requested application would promote U.S. leadership in innovative satellite technologies and services. Grant of this application will enable the continued realization of the significant benefits and commercial viability of developing novel small satellite communications systems. In addition, grant of this application will further the public interest by enabling longer-term TT&C support for the specific missions of the Sherpa-AC1, Sherpa-LTE1, Mandrake Able and Baker, VR-5, and RROCI satellites.

²³ See 47 C.F.R. § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

²⁴ See *Northeast Cellular*, 897 F.2d at 1166; see also *WAIT Radio*, 418 F.2d at 1157.

III. CONCLUSION

Based on the foregoing, RBC Signals respectfully requests that the Commission grant its application to enable its new 3.7m Earth Station to provide TT&C uplink services on S-band frequencies for the satellites discussed above. There have been no instances of harmful interference from existing TT&C uplink operations in the subject spectrum and RBC Signals will continue to ensure interference-free operations from its 3.7m Earth Station.