

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

In the Matter of

Application of RBC Signals LLC for a)	
180-Day Special Temporary Authorization)	Call Sign:
to Operate an Earth Station to Provide)	
Tracking, Telemetry & Command for a)	File No.: SES-STA-_____
Foreign-Licensed Satellite)	

REQUEST FOR SPECIAL TEMPORARY AUTHORITY

RBC Signals LLC (“RBC Signals”), pursuant to Section 25.120 of the Commission’s rules,¹ respectfully seeks a 180-day special temporary authorization (“STA”) to operate a currently authorized yagi antenna (the “400 MHz Yagi”) at its existing earth station site in Windham, New York to perform tracking, telemetry and command (“TT&C”) for a foreign-licensed, non-geostationary satellite orbit (“NGSO”) cubesat operated by Aurora Propulsion Technologies, Ltd. (“AuroraPT”). RBC Signals seeks to perform TT&C operations in the 401.0375-401.0625 MHz (space-to-Earth) and 401.0875-401.1125 MHz (Earth-to-space) bands to provide launch and operational support for the Aurorasat-1 cubesat, which will demonstrate AuroraPT’s novel plasma brake technology, a propellant-less microtether deorbiting system.

Grant of this 180-day STA will serve the public interest by enabling RBC Signals to facilitate the validation of key features of the Aurorasat-1 plasma brake tether technology and establish further space heritage of the microtether product line to the benefit of government, non-profit and commercial satellite operators.² The expected launch window for the Aurorasat-1

¹ 47 C.F.R. § 25.120.

² The mission life of the Aurorasat-1 spacecraft, approximately two years from launch including deorbiting, 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

satellite is December 1, 2020 to December 31, 2020. Therefore, RBC Signals respectfully requests that the Commission consider and authorize the proposed TT&C operations (as appropriately conditioned) as soon as practicable. RBC Signals will update the Commission with the final launch date once the launch schedule is finalized. Given the December launch timeframe, this 180-day STA request should afford sufficient time for the Commission to place this application on public notice and make a timely decision.³

I. BACKGROUND

Consistent with its existing operations at the Windham site,⁴ RBC Signals seeks to provide TT&C support for the AuroraPT spacecraft using a currently installed 400 MHz Yagi (the M2 Antenna Systems Model 400CP30A). RBC Signals operates at the site in the 401-402 MHz band with no reported cases of interference, and this request will not increase the potential for interference given its temporary, intermittent use and low transmit power. In fact, the 400 MHz Yagi will transmit at significantly lower power levels than those presently authorized under the *Windham STA* (see draft FCC Form 312 Schedule B).

The Aurorasat-1 spacecraft is operated by AuroraPT, a Finnish company developing and commercializing its water propulsion and propellant-less deorbiting technology.⁵ With the support of RBC Signals, AuroraPT seeks to demonstrate how its deorbiting technology can be utilized to

Signals intends to request renewals of the proposed 180-day STA, as necessary, to ensure appropriate Commission authority for the life of the mission.

³ In the event that this 180-day STA is not granted in time for launch in December 2020, RBC Signals will file an additional 30-day STA request to cover the launch and initial mission period for Aurorasat-1.

⁴ See RBC Signals, File No. SES-STA-20180719-01878 (“*Windham STA*”) (180-day STA extension to provide TT&C support for the Astranis mission in the 401-402 MHz band); see also File No. SES-STA-20180612-01105 (initial 30-day STA extended by the *Windham STA*).

⁵ AuroraPT has prepared the necessary ITU-related information (satellite system filings and cost-recovery documentation) in connection with this application. Moreover, the Aurorasat-1 spacecraft has been registered with Finland, a WTO-member country (Traficom – the Finnish Transport and Communications Agency – has submitted ITU filings on behalf of Aurorasat-1).

accelerate and improve the efficiency of satellite re-entry. Towards this end, the Aurorasat-1 spacecraft will allow AuroraPT to test components, software design, and operational concepts of its microtether technology. AuroraPT's plasma brake module will benefit scientists, research institutes, and commercial companies that need to move satellites with a maximum mass of 1,000 kilograms out of orbits as high as 1,000 kilometers.

As described in more detail in the Technical Description, the AuroraSat-1 is a single cubesat with two payloads: (1) a propulsive attitude control system with water propellant; and (2) the plasma brake, which is a propellant-less deorbiting system. The first phase of the mission (6-12 months) will be used to perform attitude control experiments, after which the plasma brake microtethers will be deployed. The second phase of the mission (12-24 months) includes the deployment of the plasma brake microtethers and demonstration of the satellite deorbiting system.⁶

RBC Signals' TT&C operations will be conducted on an unprotected and non-interference basis intermittently when the satellites pass over the earth station. In addition, 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. RBC Signals provides the attached Technical Appendix for detailed information on the satellite and earth station operations, including an orbital debris assessment report, antenna patterns and a draft FCC Form 312 Schedule B. As discussed below, grant of the requested STA will serve the public interest, convenience, and necessity.

⁶ If the plasma break microtethers do not deploy, the Aurorasat-1 cubesat should still passively deorbit within 2.125 years under nominal condition and a maximum of 4.57 years if the solar arrays never deploy from the nominal orbital altitude of 550 km circular SSO.

II. DISCUSSION

RBC Signals seeks to operate the 400 MHz Yagis with the Aurorasat-1 cubesat in the 401.0375-401.0625 MHz (space-to-Earth) and 401.0875-401.1125 MHz (Earth-to-space) bands. Grant of this STA request is critical for the reliability of the Aurorasat-1 mission and will not increase the potential for interference since RBC Signals is currently operating at the site at much higher power levels with no reported cases of interference.

RBC Signals understands that authority for TT&C operations does not constitute market access to the United States for the Aurorasat-1 spacecraft and therefore is not providing the full technical information contemplated by Sections 25.114 and 25.137 of the Commission's rules for U.S. market access requests.⁷ In the interest of completeness and transparency, RBC Signals provides detailed satellite information in the Technical Appendix, including an orbital debris assessment report, satellite antenna patterns and a microtether safety report.

A. Aurorasat-1 Satellite Overview

The Aurorasat-1 satellite conforms to the form factor of a 2U cubesat (200 mm x 100 mm x 100 mm in the stowed configuration and approximately 100 mm x 200 mm x 420 mm in the deployed configuration), with a total mass of approximately 1.8 kg. The Aurorasat-1 cubesat will be launched as a secondary payload aboard a SpaceX Falcon 9 launch vehicle from the Cape Canaveral Air Force Station in December 2020. The satellites will be launched into a nominal circular, sun-synchronous orbit at 550 km apogee and 550 km perigee with an inclination from the equator of 97.5°. An orbital

⁷ See 47 C.F.R. §§ 25.114 and 25.137. See also SES Americom, Inc., File No. SES-MFS-20160624-00607, Call Sign E050287 (granting authority for an earth station to provide TT&C services to the foreign-licensed ASTRA 3A operating at 86.85° W.L.); Hawaii Pacific Teleport, L.P., File No. SES-MFS-20131030-00913, Call Sign E030115 (granting authority for an earth station to provide TT&C services to ASTRA 3A operating at 176.85° W.L.); SES Americom, Inc., File No. SES-STA-20161110-00884, Call Sign E050287 (granting authority for an earth station to provide TT&C services to ASTRA 3A during drift from 86.85° W.L. to 47.0° W.L.); Hawaii Pacific Teleport, L.P., File No. SES-STA-20131030-00914, Call Sign E030115 (granting authority for an earth station to provide TT&C services to ASTRA 3A operating at 176.85° W.L.).

lifetime calculation for this orbit estimates that the satellite will remain in orbit for approximately 4.57 years (under worst case conditions), well within the limits set by internationally accepted guidelines.⁸

B. TT&C 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 401-402 MHz band is shared on a co-primary basis between meteorological aids (Earth-to-space) and space operations services (space-to-Earth). RBC Signals seeks to perform TT&C operations in the 401.0375-401.0625 MHz (space-to-Earth) and 401.0875-401.1125 MHz (Earth-to-space) bands consistent with the co-primary space operations allocation in this band.⁹

RBC Signals acknowledges that there are certain U.S. government meteorological aids and earth exploration operations conducted in the 401-402 MHz band.¹⁰ Moreover, RBC Signals understands that although expanded Federal use of the 401-402 MHz band is anticipated, such plans do not commence until well after the end of the AuroraSat-1 mission. RBC Signals will continue to work with Commission staff to ensure that these temporary TT&C operations will not increase the potential interference to current or future government users, and will coordinate with NASA, GOES NOAA, and other U.S. government agencies to ensure that the TT&C operations proposed herein are compatible with government operations and that the interests of the United States are fully accommodated.

⁸ See Orbital Debris Assessment Report (attached).

⁹ See 47 C.F.R. § 2.1 (defining “space operations” as “a radiocommunication service concerned exclusively with the operation of spacecraft, in particular space tracking, space telemetry, and space telecommand.”).

¹⁰ See https://www.ntia.doc.gov/files/ntia/publications/compendium/0401.00-0402.00_01MAR14.pdf.

The earth station site in Windham, New York currently supports TT&C operations (transmit and receive) in the 401-402 MHz band with no reported cases of interference, and RBC Signals' proposed TT&C operations under this STA will be conducted at considerably lower power levels than those currently authorized under the *Windham STA*. Thus, the proposed TT&C operations in this band will not present an increased interference risk to other authorized users.

C. STA Request & Public Interest Considerations

RBC Signals respectfully seeks this 180-day STA pursuant to Section 25.120 of the Commission's rules, 47 C.F.R. § 25.120. A 180-day STA is appropriate because RBC Signals does not plan to file an application for regular authority for the subject TT&C operations because the length of the mission (approximately two years) does not warrant a long-term commercial earth station license (i.e., a 15-year term). The scheduled December 2020 launch date should afford sufficient time to place this application on public notice and make a determination, however, RBC Signals reserves the right to file an additional 30-day STA request to cover the launch and initial mission period for Aurorasat-1 if this STA is not timely granted.

AuroraPT realizes the critical importance of reliable TT&C support for mission optimization given the satellite's novel propulsion and deorbiting systems, and RBC Signals can provide tested and proved ground station support using its existing facility operating in the 401-402 MHz band at the Windham, New York facilities without increasing the potential for interference into other operations. Moreover, grant of this STA request is in the public interest because it will facilitate the safe operation of the Aurorasat-1 spacecraft by ensuring reliable TT&C functions in time for the launch of the satellite, and further assist AuroraPT in validating the commercial viability of the microtether technology to the benefit of all NGSO satellite operators.

III. CONCLUSION

Based on the foregoing, the public interest would be served by a grant of this 180-day STA request to allow RBC Signals to perform TT&C for the Aurorasat-1 spacecraft in the 401.0375-401.0625 MHz (space-to-Earth) and 401.0875-401.1125 MHz (Earth-to-space) from its existing earth station facility in Windham, New York.