

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

In the Matter of

Application of RBC Signals LLC for a)
60-Day Special Temporary Authorization) Call Sign:
("STA") To Operate an Earth Station To)
Provide Tracking, Telemetry & Command) File No.:
("TT&C") to Foreign-Licensed Satellites)

REQUEST FOR SPECIAL TEMPORARY AUTHORITY

RBC Signals LLC ("RBC Signals"), pursuant to Section 25.120 of the Commission's Rules, 47 C.F.R. § 25.120, respectfully seeks a 60-day special temporary authorization ("STA") to operate a M2 Antenna Systems 3.5m earth station (the "M2 3.5m") at a facility in Deadhorse, Alaska to communicate with certain foreign-licensed low-Earth orbit ("LEO") mobile-satellite service ("MSS") cubesats to perform tracking, telemetry and command ("TT&C") for housekeeping, orientation and subsystem control following the satellites' launch. RBC Signals seeks to perform these short-term TT&C operations in the 399.926-399.950 MHz band (Earth-to-space) and 401.05-401.25 MHz band (space-to-Earth). RBC Signals seeks this 60-day STA to ensure the timely initiation of TT&C operations and plans to file an application for regular earth station operating authority.

I. BACKGROUND

RBC Signals is a Seattle, Washington-based satellite services company that provides earth station services around the world. RBC Signals partners with other earth station operators or operates its own earth stations to efficiently support various satellite service applications.

RBC Signals seeks short-term authority to conduct TT&C operations for three U.K.-licensed 3U cubesats – Red Diamond, Green Diamond and Blue Diamond (the "3 Diamonds") – that will operate at an altitude of approximately 500 km in MSS spectrum at 2170-2200 MHz (space-to-

Earth) and 1980-2010 MHz (Earth-to-space), subject to coordination with incumbent operations. The 3 Diamonds are demonstration and proof-of-concept satellites launched in connection with the development of Sky and Space Global (UK) Ltd.'s ("SSG")¹ proposed cubesat constellation to provide affordable narrowband mobile communication services to users in Asia, Africa and Latin America. The SSG constellation will provide lifeline connectivity services to users in the region within +/-15 degrees of the equator.² Satellites may be added in the future to expand this initial coverage region.

The 3 Diamonds satellites will be launched together as a group with a mission life of between two and five years and will be closely spaced to have overlapping beams for testing satellite hand-off, link performance and other functionality. However, no MSS service link testing or demonstration will be done in the United States; only TT&C communications will take place in U.S. territory. This 60-day STA will cover initial TT&C for the 3 Diamonds satellites and RBC Signals plans to file an application for longer-term authority for these operations.

RBC Signals has examined other operations in the band and has been in discussions with FCC, NTIA and NOAA staff for the past several weeks to ensure that the proposed TT&C operations will not cause interference to current or future U.S. government users of the band, and that the short-term and longer-term interests of the United States are fully accommodated. The nature of RBC Signals' application for longer-term authority earth station operating authority (e.g., an earth station license application versus 180-day STA requests) will be informed by U.S. government guidance provided in the context of these consultations.

¹ SSG is a wholly owned subsidiary of Sky and Space Global Limited, a publicly traded Australian company (ASX ticker symbol: SAS). RBC Signals has attached a presentation summarizing SSG's novel NGSO system concept, progress to date and future plans as Attachment 1.

² The full SSG constellation will operate under the SSG-CSL NGSO system filing submitted to the ITU by the United Kingdom late last year.

II. DISCUSSION

RBC Signals seeks to operate the M2 3.5m – a variant of an earth station that has been previously licensed by the Commission for similar TT&C operations³ – with the 3 Diamonds satellites in the 399.926-399.950 MHz band (uplink) and 401.05-401.25 MHz band (downlink). RBC Signals is not requesting U.S. market access for the 3 Diamonds satellites to operate or demonstrate service links in the United States and therefore is not providing the full technical information required by Sections 25.114 and 25.137 of the Commission’s rules, 47 C.F.R. §§ 25.114 and 25.137. To the extent necessary, RBC Signals respectfully seeks a waiver of Section 25.114 and 25.137 of the Commission’s rules to permit the limited TT&C operations proposed herein.

Nonetheless, RBC Signals provides information herein, the companion Technical Appendix, Attachments and draft FCC Form 312 Schedule B, which contain relevant information relating to the proposed TT&C operations, including earth station operational characteristics, satellite technical and orbital parameters, TT&C link budgets and an orbital debris mitigation statement for the 3 Diamonds satellites.⁴ Grant of this STA request is in the public interest because it will facilitate the safe operation of the 3 Diamonds satellites during testing and demonstration and ensure the timely initiation of TT&C for these novel and important cubesat operations.

A. TT&C Uplink Operations

The United States Table of Frequency Allocations (“Table of Allocations”), Section 2.106

³ See Spire Global, Inc., File No. SES-LIC-20160317-00249, Call Sign E160035.

⁴ The 3 Diamonds satellites will operate under the SSG-CSL and SSG-3D ITU NGSO system filings submitted by the United Kingdom late last year. RBC Signals understands that coordination is ongoing and that certain adjustments to the initial ITU filings for the demonstration satellites may be forthcoming. RBC Signals also has attached the UK licenses for the Red Diamond, Green Diamond and Blue Diamond satellite as Attachment 2.

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 MSS and federal radionavigation-satellite services. RBC Signals seeks to perform limited TT&C uplink operations in frequencies from 399.926-399.950 MHz consistent with the co-primary MSS allocation in this band.

As discussed above, the 3 Diamonds satellites will be launched as demonstration satellites for SSG's MSS constellation and will provide data, voice and messaging services directly to fixed and mobile terminals. These terminals include land, maritime and aeronautical mobile terminals, as well as fixed terminals that may serve as base stations for "bring your own" mobile devices. Additional information regarding the 3 Diamonds mission and SSG's long-term constellation can be found on the SSG web site.⁵

RBC Signals will operate the M2 3.5m earth station at a site in Deadhorse, Alaska and provide TT&C uplink operations for SSG's MSS system consistent with the MSS allocation in the band.⁶ Given the altitude and spacing of the 3 Diamonds satellites (with overlapping beams),⁷ the proposed TT&C earth station will transmit approximately 5% of the time to communicate with the satellites. The limited transmission window, as well as the remote location of the facility (in the North Slope of Alaska), limit the potential for interference from the proposed operations.

⁵ See <https://www.skyandspace.global/operations-overview/>.

⁶ The limited, data-only TT&C operations for the 3 Diamonds MSS demonstration satellites are consistent with the Commission's limitation on use of the band for non-voice communications of NGSO satellites. See 47 C.F.R. §25.103 ("Definitions... *Non-Voice, Non-Geostationary (NVNG) Mobile-Satellite Service*. A Mobile-Satellite Service reserved for use by non-geostationary satellites in the provision of non-voice communications which may include satellite links between land earth stations at fixed locations.") See also Section II.D, *infra*, requesting, out of an abundance of caution, a waiver to permit TT&C uplink operation in this MSS band.

⁷ The rising order of satellites above the horizon is Blue, then Green, then Red. Initial relative orbit phasing between Blue and Green is 0.31735 degrees, and between Blue and Red is 2.53879 degrees. After phasing end (end of July) the relative phasing between Blue and Green will be 4.44 degrees and between Blue and Red will be 8.88 degrees.

RBC Signals understands that there is limited U.S. government use of the band,⁸ but acknowledges that there is a pending FCC rulemaking addressing further use of this band,⁹ as well as a proceeding developing U.S. preliminary views on a related WRC-19 agenda item.¹⁰ RBC Signals acknowledges that any grant of earth station operating authority would be subject to the outcome of these proceedings. In addition, as noted previously, RBC Signals is consulting with NTIA and NOAA staff to ensure that the interests of the United States are fully accommodated and that the proposed TT&C services will not cause interference to current or future U.S. government operations.

In view of the foregoing, RBC Signals anticipates that its operations will be compatible with spectrum users and will present no potential for interference in the 399.926-399.950 MHz uplink band. RBC Signals will conduct its TT&C operations on a non-harmful interference basis and, if RBC Signals learns that its operations are causing harmful interference to other operations, it will modify or suspend operations to immediately resolve such interference.

B. TT&C Downlink Operations

The Table of Allocations provides that the 401-402 MHz band is shared on a co-primary basis between meteorological aids and space operations services. RBC Signals seeks to perform TT&C downlink operations in frequencies from 401.05-401.25 MHz consistent with the co-primary

⁸ See https://www.ntia.doc.gov/files/ntia/publications/compendium/0399.90-0400.05_01DEC15.pdf.

⁹ See generally Amendment of Part 2 of the Commission's Rules for Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations; Federal Space Station Use of the 399.9-400.05 MHz Band; and Allocation of Spectrum for Non-Federal Space Launch Operations, ET Docket No. 13-115, RM-11341; see also <https://www.fcc.gov/items-on-circulation>.

¹⁰ See International Bureau Seeks Comment on Recommendations Approved by World Radiocommunication Conference Advisory Committee, Public Notice, IB Docket No. 16-185, DA 17-365 (rel. Apr. 24, 2017).

space operations allocation in this band.¹¹

RBC Signals understands that there is no U.S. government use of the 400.05-400.15 MHz sub-band,¹² but there are certain meteorological aids and space research operations conducted in the 400.15-400.25 MHz sub-band.¹³ Based on our research and consultations to date, RBC Signals believes the proposed TT&C downlink (earth station receive) operations in this band will not present a potential for interference into other users of this band.¹⁴ However, if RBC Signals learns that its operations are causing harmful interference to other operations, it will suspend or modify its operations to immediately resolve such interference.

C. The 3 Diamonds Satellites

SSG is developing technology that will permit cubesats to deliver narrowband connectivity services to otherwise unconnected users in remote locations on an extremely cost-effective basis. When fully launched, the SSG constellation will support user voice calls and messaging, machine-to-machine (“M2M”) and Internet of Things (“IoT”) services, and data storage and forwarding in both fixed and mobile applications in MSS spectrum at 2170-2200 MHz (space-to-Earth) and 1980-2010 MHz (Earth-to-space), subject to coordination with incumbent operations. The 3 Diamonds satellites’ TT&C spectrum assignments were approved by the UK Ministry of Defence, representing

¹¹ 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.”).

¹² See https://www.ntia.doc.gov/files/ntia/publications/compendium/0400.05-0400.15_01DEC15.pdf.

¹³ See https://www.ntia.doc.gov/files/ntia/publications/compendium/0400.15-0401.00_01DEC15.pdf.

¹⁴ RBC Signals would also note that the downlink PFD of the 3 Diamonds satellites in the 400.15-400.25 MHz sub-band is -134 dBW/(m² · 4 kHz), 9 dB lower than the -125 dBW/(m² · 4 kHz) limit set forth in Annex 1 of App. 5 of the ITU Radio Regulations. See RR 5.264 and 47 C.F.R. § 2.106.

a substantial validation of SSG’s narrow-band satellite communications platform.¹⁵

SSG was recently awarded Frost & Sullivan’s 2016 Global Narrow-Band Nano-Satellite Connectivity Services Technology Innovation Award for its proposed satellite communications constellation concept.¹⁶ Additionally, SSG recently signed an agreement with the U.S. Department of Defense (“DOD”) for space situational awareness services to help ensure the safe operations of the 3 Diamonds satellites.¹⁷

Through its partnership with the Indian Space Research Organization (“ISRO”), SSG will launch its three UK-licensed cubesats on or about June 23, 2017. The requested STA is intended to support initial TT&C operations for SSG’s demonstration and proof-of-concept satellites and RBC Signals will file an underlying application for longer-term TT&C earth station operating authority.

D. Waiver Requests

The Commission may waive its rules for “good cause shown.”¹⁸ As discussed below, good cause exists to waive certain rules in this case if necessary to permit RBC Signals to perform critical TT&C functions for the 3 Diamonds demonstration mission, such waivers would not undermine the purpose of the rules, and such waivers are consistent with Commission policies and precedent.

1. Waiver of Sections 25.114 and 25.137

RBC Signals respectfully seeks a waiver of Sections 25.114 and 25.137 of the Commission’s rules, 47 C.F.R. §§ 25.114 and 25.137, to the extent necessary to perform TT&C for the 3 Diamonds without making the full technical showings required for non-U.S. licensed space

¹⁵ See <http://www.asx.com.au/asxpdf/20160927/pdf/43bhb4pwhkhym8.pdf>.

¹⁶ See <https://www.slideshare.net/FrostandSullivan/2016-global-narrowband-nanosatellite-connectivity-services-technology-innovation-award>.

¹⁷ See <https://www.skyandspace.global/sky-space-signs-agreement-us-department-defence/>.

¹⁸ See 47 C.F.R. § 1.3. *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

stations to access the U.S. market.

As noted, RBC Signals is not requesting U.S. market access nor any other authorization to test and demonstrate the 3 Diamonds satellites service functionality in the United States. Accordingly, RBC Signals is not providing the full technical information contemplated by Sections 25.114 and 25.137 of the Commission's rules for such authority. In the attached Technical Appendix, however, RBC Signals provides technical information necessary to assess earth station and satellite operational characteristics, including link budgets, emissions information and an orbital debris mitigation statement for the 3 Diamonds satellites.

Section 25.137 of the Commission's rules requires that an applicant proposing to use a U.S.-licensed earth station to communicate with foreign-licensed spacecraft demonstrate that the Commission's policies for U.S. market access are satisfied, including the obligation to file detailed satellite technical information as specified in Section 25.114. Because the M2 3.5m earth station will be used solely for TT&C operations and no SSG satellite services will be conducted in the United States, and because sufficient information to assess the satellites' operation in the relevant bands has been submitted, grant of a waiver will not undermine the purpose of these requirements.

The 3 Diamonds satellites are licensed by the United Kingdom, a WTO-member country. To the extent relevant, there is a presumption in favor of entry for these satellites.¹⁹ In addition, the United Kingdom has stringent satellite licensing requirements, including for orbital debris mitigation purposes, that are well-recognized by the Commission.²⁰ Thus, the Commission can be assured that operation of the 3 Diamonds satellites will be fully consistent with international

¹⁹ See 47 C.F.R. § 25.137(a)(2).

²⁰ See generally Inmarsat plc, Petition for Declaratory Ruling, File Nos. SAT-PPL-20081219-00235 and SAT-APL-20090609-00068, Call Sign S2780.

standards and requirements.

Moreover, strictly requiring a full satellite application technical demonstration is unnecessary and unduly burdensome in this limited context. RBC Signals is proposing to operate a single earth station in a remote area of Alaska for the limited purpose of performing TT&C during the 3 Diamonds demonstration mission. It has provided relevant satellite and earth station technical characteristics in the attached Technical Appendix and draft FCC Form 312 Schedule B, and the proposed TT&C operations will be consistent with industry practice and conducted on a non-harmful interference basis.

The Commission has previously granted similar waivers in the context of proposed TT&C operations with foreign-licensed satellites.²¹ Accordingly, grant of the requested waiver is consistent with Commission precedent and would permit RBC Signals to timely commence TT&C operations to support the 3 Diamonds demonstration mission.

2. Waiver of Section 25.202(g)(1)

Section 25.202(g)(1) provides that “telemetry, tracking, and command signals may be transmitted in frequencies within the assigned bands that are not at a band edge only if the transmissions cause no greater interference and require no greater protection from harmful interference than the communications traffic on the satellite network or have been coordinated with

²¹ *See, e.g.*, 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 earth station to provide TT&C services to ASTRA 3A operating at 176.85° W.L.); PanAmSat Licensee Corp., File No. SES-STA-20090922-01212, Call Sign E040125 (granting authority for an earth station to communicate with the foreign-licensed NSS-12 satellite for purposes of providing launch and early operations services).

operators of authorized co-frequency space stations”²² It is not clear that this rule applies in the context of the dedicated 3 Diamonds’ TT&C frequencies approved by the United Kingdom and assigned to SSG, but RBC Signals requests a waiver of the rule out of an abundance of caution.

The general purpose of the rule is to simplify the coordination process for satellite systems, to provide an incentive for the operator to maximize the efficiency of its system’s TT&C operations, and to minimize the constraints placed on other satellite operations;²³ and Section 25.202(g)(1) includes language stating the interference potential and protection required for TT&C operations shall be no greater than those of other co-frequency communications traffic on the satellite. Because SSG has been assigned a dedicated TT&C band, there is no basis to compare its TT&C transmissions with other traffic in a separate frequency band. Similarly, because the TT&C frequencies have been assigned to SSG, there is no question of whether the frequencies are or are not at the band edge.

But there may be a question as to whether the assigned TT&C frequencies would be considered in the satellites’ service band and band edge under Section 25.202(g). The Commission has permitted TT&C operations outside of a satellite’s assigned service band where it has found the operations will not cause interference to other licensed operations and will otherwise serve the public interest.²⁴ The Commission also has permitted mid-band TT&C operations consistent with

²² See 47 C.F.R. § 25.202(g)(1). The operational characteristics of the 3 Diamonds’ TT&C have been selected to minimize interference into other satellite networks. See 47 C.F.R. § 25. 202(g)(2).

²³ See, e.g., *Amendment of the Commission’s Rules with regard to the 3650-3700 MHz Government Transfer Band; The 4.9 GHz Band Transferred from Federal Government Use*, First Report and Order and Second Notice of Proposed Rulemaking, 15 FCC Rcd 20488, 20538-39, para. 129 (2000).

²⁴ See, e.g., *EchoStar Satellite Operating Corp.*, File No. SAT-LOA-20070105-00003, Call Sign 2725 (March 18, 2009).

Section 25.202(g)'s requirements.²⁵ For the same reasons and to the extent necessary in this STA request, grant of a waiver would not undermine the purpose of the rule, would be consistent with Commission precedent and would serve the public interest.

E. Public Interest Considerations

RBC Signals respectfully requests this 60-day STA pursuant to Section 25.120 of the Commission's Rules, 47 C.F.R. § 25.120. Section 25.120(a) provides that STA requests should be filed at least three working days prior to the date of commencement of the proposed operations. Here, RBC Signals is proposing to commence operations on or about June 23, 2017. Additionally, the Commission may grant a 60-day STA if the STA request has not been placed on public notice and the applicant plans to file a request for regular authority for the operations. RBC Signals plans to file an application for longer-term authority as soon as possible, based on further consultations with the FCC staff and other U.S. government agencies, to permit continuing TT&C operations for the 3 Diamonds demonstration mission.

Expeditious processing of this STA request will ensure that RBC Signals is able to commence TT&C in time for the launch of the 3 Diamonds satellites and assist SSG in demonstrating the significant benefits of its novel satellite communications system. For its part, the 3 Diamonds demonstration mission will help the satellite industry delivery affordable satellite-based connectivity services to remote locations, reaching diverse regions and customers. RBC Signals acknowledges that any action on the requested STA will not affect the Commission's ultimate determination with respect to the application for longer-term TT&C earth station operating authority.

²⁵ See, e.g., Iridium Constellation LLC, ORDER AND AUTHORIZATION, File Nos. SAT-MOD-20131227-00148 and SAT-AMD-20151022-00074, Call Sign S2110 (Aug. 1, 2016).

III. CONCLUSION

In view of the foregoing, including the unique and limited scope of this request, the public interest would be served by a grant of a 60-day STA to allow RBC Signals to perform TT&C for the U.K.-licensed 3 Diamonds satellites commencing on or about June 23, 2017.