

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

In the Matter of

Application of RBC Signals LLC for an	)	
Extension of its Existing Special	)	Call Sign: N/A
Temporary Authority To Operate an Earth	)	
Station To Provide Tracking, Telemetry &	)	File Nos.: SES-STA-20170731-00848
Command to Foreign-Licensed Satellites	)	& SES-STA-20180302-00176

**REQUEST FOR SPECIAL TEMPORARY AUTHORIZATION EXTENSION**

RBC Signals LLC (“RBC Signals”), pursuant to Section 25.120(a) of the Commission’s rules, 47 C.F.R. § 25.120(a), respectfully seeks an extension of its existing 60-day special temporary authorization (“STA”)<sup>1</sup> commencing on June 10, 2018. RBC Signals seeks to continue to operate the M2 Antenna Systems earth station (the “M2 antenna”) at a facility in Deadhorse, Alaska to communicate with three (3) U.K-licensed low-Earth orbit (“LEO”) mobile-satellite service (“MSS”) cubesats to perform tracking, telemetry and command (“TT&C”) in the 399.926-399.950 MHz band (Earth-to-space) and 401.05-401.25 MHz band (space-to-Earth). This STA will allow RBC Signals to continue operations consistent with its current *60-Day STA* until its long-term commercial license application<sup>2</sup> is acted upon by the Commission.

**I. BACKGROUND**

RBC Signals is a Seattle, Washington-based satellite services company that provides earth station services around the world. RBC Signals has held numerous STAs to provide similar TT&C

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<sup>1</sup> See RBC Signals LLC, File No. SES-STA-20180302-00176 (expires on June 10, 2018) (“*60-Day STA*”). The *60-Day STA* is an extension of RBC Signal’s original 180-day STA for identical operations. See File No. SES-STA-20170731-00848 (expired on March 10, 2018) (“*180-Day STA*”).

<sup>2</sup> See RBC Signals LLC, File Nos. SES-LIC-20180201-00081 & SES-AFS-20180321-00238, Call Sign E180010 (“*Commercial License Application*”).

support for multiple LEO non-geostationary orbit satellite (“NGSO”) cubesats from the Deadhorse facility,<sup>3</sup> including for the three U.K.-licensed 3U cubesats – the Red Diamond, Green Diamond and Blue Diamond (the “3 Diamonds”) – which are the subject of this STA extension request.<sup>4</sup> The 3 Diamonds, launched on June 23, 2017 with a mission life of between two and five years, are demonstration and proof-of-concept satellites launched in connection with the development of Sky and Space Global (UK) Ltd.’s (“SSG”)<sup>5</sup> 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.

The 3 Diamonds satellites are closely spaced at an altitude of approximately 500 km, operate service links in MSS spectrum at 2170-2200 MHz (space-to-Earth) and 1980-2010 MHz (Earth-to-space), and have overlapping beams for testing satellite hand-off, link performance and other functionality. Like the identical *60-Day STA*, RBC Signals does not seek authority to conduct MSS service link testing or demonstration in this STA request.

RBC Signals operations have been coordinated with relevant U.S. government agencies and have not caused interference to U.S. government users of the band. Moreover, RBC Signals has

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<sup>3</sup> See, e.g., RBC Signals, LLC, File Nos. SES-STA-20171213-01333 (60-Day STA to provide TT&C for Planetary Resources Development Corp. cubesats), SES-STA-20180118-00042 (60-Day STA to provide TT&C for Astranis Space Technology Corp. cubesats).

<sup>4</sup> The 3 Diamonds satellites will operate under the SSG-CSL and SSG-3D ITU NGSO system filings and the UK licenses for the Red Diamond, Green Diamond and Blue Diamond satellites are included as Attachment 2. RBC Signals acknowledges that authority for TT&C operations does not constitute market access to the United States for the SSG satellites 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.

<sup>5</sup> SSG is a wholly owned subsidiary of Sky and Space Global Limited, a publicly traded Australian company (ASX ticker symbol: SAS). RBC Signals has provided a presentation summarizing SSG’s novel NGSO system concept, progress to date and future plans in Attachment 1.

examined other operations in the band and will continue to work with FCC, NTIA and NOAA staff to ensure that the proposed operations create no potential for interference to current or future government users and that the interests of the United States are fully accommodated.

## **II. DISCUSSION**

RBC Signals seeks to continue to operate the M2 antenna with the 3 Diamonds satellites in the 399.926-399.950 MHz band (uplink) and 401.05-401.25 MHz band (downlink). RBC Signals incorporates by references the information previously provided with the *60-Day STA* and *180-Day STA*,<sup>6</sup> including the 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.<sup>7</sup>

Grant of this STA request is in the public interest because it will ensure the uninterrupted and safe operation of the 3 Diamonds satellites during testing, ensuring no lapse in control. Moreover, a grant of this request will allow for continued early stage analysis of the technical feasibility of the SSG constellation and more thorough demonstrations 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 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

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<sup>6</sup> *Supra* n. 1.

<sup>7</sup> RBC Signals also updates the geographic coordinates of the Deadhorse facility in order to accurately reflect the *Commercial License Application*.

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 were 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.<sup>8</sup>

RBC Signals will continue to operate the M2 antenna at the Deadhorse, Alaska site and provide TT&C uplink operations for SSG's MSS system consistent with the MSS allocation in the band.<sup>9</sup> Given the altitude and spacing of the 3 Diamonds satellites (with overlapping beams),<sup>10</sup> the proposed TT&C earth station 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.

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<sup>8</sup> See <https://www.skyandspace.global/operations-overview/>.

<sup>9</sup> 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.").

<sup>10</sup> The rising order of satellites above the horizon was Blue, then Green, then Red. Initial relative orbit phasing between Blue and Green was 0.31735 degrees, and between Blue and Red was 2.53879 degrees. Upon phasing completion, the relative phasing between Blue and Green is 4.44 degrees and between Blue and Red is 8.88 degrees.

RBC Signals understands that there is limited U.S. government use of the band,<sup>11</sup> but acknowledges that there is a pending FCC rulemaking addressing further use of this band,<sup>12</sup> as well as a proceeding developing U.S. preliminary views on a related WRC-19 agenda item.<sup>13</sup> RBC Signals acknowledges that any grant of earth station operating authority would be subject to the outcome of these proceedings and will continue consultations with NTIA and NOAA staff to ensure that the interests of the United States are fully accommodated and that the proposed operations will not cause interference to current or future U.S. government operations.

RBC Signals' TT&C operations thus far have been compatible with spectrum users and have not caused interference in the 399.926-399.950 MHz uplink band. Thus, RBC Signals anticipates no compatibility or potential inference issues as a result of this STA extension request. Consistent with its existing authorization, 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

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<sup>11</sup> See [https://www.ntia.doc.gov/files/ntia/publications/compendium/0399.90-0400.05\\_01DEC15.pdf](https://www.ntia.doc.gov/files/ntia/publications/compendium/0399.90-0400.05_01DEC15.pdf).

<sup>12</sup> 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>.

<sup>13</sup> 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).

TT&C downlink operations in frequencies from 401.05-401.25 MHz consistent with the co-primary space operations allocation in this band.<sup>14</sup>

RBC Signals understands that there is no U.S. government use of the 400.05-400.15 MHz sub-band,<sup>15</sup> but there are certain meteorological aids and space research operations conducted in the 400.15-400.25 MHz sub-band.<sup>16</sup> Based on our research and consultations to date, RBC Signals believes the proposed TT&C downlink (earth station receive) operations in this band will continue to present no potential for interference to other users of this band.<sup>17</sup> Of course, 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

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<sup>14</sup> 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.”).

<sup>15</sup> See [https://www.ntia.doc.gov/files/ntia/publications/compendium/0400.05-0400.15\\_01DEC15.pdf](https://www.ntia.doc.gov/files/ntia/publications/compendium/0400.05-0400.15_01DEC15.pdf).

<sup>16</sup> See [https://www.ntia.doc.gov/files/ntia/publications/compendium/0400.15-0401.00\\_01DEC15.pdf](https://www.ntia.doc.gov/files/ntia/publications/compendium/0400.15-0401.00_01DEC15.pdf).

<sup>17</sup> 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/(m<sup>2</sup> · 4 kHz), 9 dB lower than the -125 dBW/(m<sup>2</sup> · 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.

satellites' TT&C spectrum assignments were approved by the UK Ministry of Defence, representing a substantial validation of SSG's narrow-band satellite communications platform.<sup>18</sup>

SSG was awarded Frost & Sullivan's 2016 Global Narrow-Band Nano-Satellite Connectivity Services Technology Innovation Award for its satellite constellation concept.<sup>19</sup> Additionally, SSG 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.<sup>20</sup>

Through its partnership with the Indian Space Research Organization ("ISRO"), SSG launched its three UK-licensed cubesats on June 23, 2017. The requested STA is intended to support TT&C operations for SSG's demonstration and proof-of-concept satellites until SSG can obtain experimental license authority for such operations.

#### **D. STA Request & Public Interest Considerations**

Section 25.120(a) provides that an STA extension request should be filed at least three business days prior to the expiration of the existing temporary authorization. RBC Signal's existing 60-day authorization expires on June 10, 2018, and thus it has timely filed this STA extension request. Pursuant to Commission rules, RBC Signals understands that this timely filed extension request will effectively extend its current temporary authority until the Commission acts on the instant request, affording sufficient time for processing this request and enabling RBC Signals to continue to support the 3 Diamonds.<sup>21</sup>

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<sup>18</sup> See <http://www.asx.com.au/asxpdf/20160927/pdf/43bhb4pwhkhym8.pdf>.

<sup>19</sup> See <https://www.slideshare.net/FrostandSullivan/2016-global-narrowband-nanosatellite-connectivity-services-technology-innovation-award>.

<sup>20</sup> See <https://www.skyandspace.global/sky-space-signs-agreement-us-department-defence/>.

<sup>21</sup> See 47 C.F.R. §§ 25.120 & 25.163(b); Administrative Procedure Act § 9(b). See also 47 C.F.R. §1.955(b); *In the Matter of Marc D. Sobel Application for Consent to Assign the License for Conventional 800 MHz SMR Station KKT934, Montrose, California*, Memorandum Opinion & Order, FCC 05-90, ¶¶ 2 & 6.

In addition, Section 25.120(b)(3) states that the Commission may grant a temporary authorization for up to 60 days if the STA request has not been placed on public notice and if a request for regulatory authority will be filed by the applicant. As noted, RBC Signals has already filed an application for the long-term earth station operations proposed herein.

Grant of this STA request will further the public interest by ensuring there is no interruption of RBC Signals' TT&C operations for the 3 Diamonds satellites and enabling the continued demonstration of the significant benefits and commercial viability of SSG's satellite communications system. For its part, the 3 Diamonds demonstration mission will continue to 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 its application for long-term TT&C earth station operating authority.

### **III. CONCLUSION**

In view of the foregoing, the public interest would be served by a grant of this STA extension to allow RBC Signals to continue to perform TT&C functions for the U.K.-licensed 3 Diamonds demonstration satellites, commencing on June 10, 2018, following the expiration of the *60-Day STA*.