

TECHNICAL APPENDIX

RBC Signals LLC 60-Day Special Temporary Authorization (STA)

- I. M2 Antenna Systems Earth Station Radiation Hazard Report
- II. 3 Diamonds Orbital Debris and Deorbit Report
- III. TT&C Link Budgets
- IV. TT&C Contours Map
- V. Draft FCC Form 312 Schedule B
- VI. Technical Certification

I. Radiation Hazard Report

This report analyzes the non-ionizing radiation levels for a 3.57-meter yagi antenna earth station system. The analysis and calculations performed in this report comply with the methods described in the FCC Office of Engineering and Technology's (OET) Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields Bulletin 65, Supplement B. The radiation safety limits used in the analysis are in conformance with OET 65, Appendix A which specifies that there are two separate tiers of exposure limits that are dependent on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment are shown in Table 1. The General Population/Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power density levels of the earth station in the far-field, near-field, transition region, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1 Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm ²)
0.3 - 1.34	100
1.34 - 30	100/F ²
30 - 300	0.2
300 - 1,500	F/1500
400	0.266666667
1,500 - 100,000	1
F - Frequency (MHz)	

Table 2 Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm ²)
0.3 - 3.0	100
3.0 - 30	900/F ²
30 - 300	1
300 - 1,500	F/300
400	1.333333333
1,500 - 100,000	5
F - Frequency (MHz)	

Table 3 Parameters Used for Calculating Power Densities

Parameter	Symbol	Formula	Value	Units
Antenna Largest Dimension	D	Input	3.57	m
Frequency	F	Input	400	MHz
Wavelength	λ	$300 / F$	0.75	m
Transmit Power	P	Input	12.530	W
Antenna Gain	G_{es}	Input	17	dBi
Antenna Gain (factor)	G_{es}	$10^{G_{es}/10}$	50.119	n/a
Pi	π	Constant	3.142	n/a
Antenna Efficiency	η	Input	0.95	n/a
Antenne Equiv Surface Area	$A_{Surface}$	$G\lambda^2/(4\pi)/\lambda$	2.362	m^2

Far Field Calculation

The distance to the beginning of the far field can be determined from the following equation:

$$\text{Distance to the Far Field Region} \quad R_{ff}=0.60 D^2/\lambda =10.2 \text{ m} \quad (1)$$

The maximum main beam power density in the far field can be determined from the following equation:

$$\begin{aligned} \text{On-Axis Power Density in the Far Field} \quad S_{\pi} &= GP/(4\pi R_{ff}^2) \\ &= 0.48 \text{ W/m}^2 \\ &= 0.048 \text{ mW/cm}^2 \end{aligned} \quad (2)$$

Near Field Calculation

Power density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same surface area as the antenna. Past the boundary of the Near Field region, the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:

$$\begin{aligned} \text{Extent of the Near Field} \quad R_{nf} &= D^2/(4\lambda) \\ &= 4.25 \text{ m} \end{aligned} \quad (3)$$

The maximum power density in the Near Field can be determined from the following equation:

$$\begin{aligned} \text{Near Field Power Density} \quad S_{nf} &= 4\eta P/A_{surface} \\ &= 20.16 \text{ W/m}^2 \\ &= 2.016 \text{ mW/cm}^2 \end{aligned} \quad (4)$$

Transition Region Calculation

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 2 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance R_{tz} can be determined from the following equation:

$$\begin{aligned} \text{Transition Region Power Density} \quad S_{tz} &= S_{nf} * R_{nf} / R_{tz} & (5) \\ &= 20.16 \text{ W/m}^2 \\ &= 2.016 \text{ mW/cm}^2 \end{aligned}$$

R_{tz} is calculated at a distance of 4.25 meters from the antenna, which is the worst-case distance. This is the edge of the near-field, R_{nf} .

Region Between Antenna and the Ground

Assuming uniform illumination of the antenna surface, the power density between the antenna and the ground can be determined from the following equation:

$$\begin{aligned} \text{Power Density between Antenna and} \quad S_g &= P / A_{\text{surface}} & (6) \\ \text{Ground} &= 5.31 \text{ W/m}^2 \\ &= 0.531 \text{ mW/cm}^2 \end{aligned}$$

Summary of Calculations

Table 4 Summary of Expected Radiation Levels for Uncontrolled Environment

Region	Density Level (mW/cm ²)		Hazard Assessment
Far Field ($R_{ff} = 10.2 \text{ m}$)	S_{ff}	0.05	Satisfies FCC MPE
Near Field ($R_{nf} = 4.25 \text{ m}$)	S_{nf}	2.02	Potential Hazard
Transition Region ($R_{nf} < R_{tz} < R_{ff}$)	S_{tz}	2.02	Potential Hazard
Between Antenna and Ground	S_g	0.53	Potential Hazard

Table 5 Summary of Expected Radiation Levels for Controlled Environment

Region	Density Level (mW/cm ²)		Hazard Assessment
Far Field ($R_{ff} = 10.2 \text{ m}$)	S_{ff}	0.05	Satisfies FCC MPE
Near Field ($R_{nf} = 4.25 \text{ m}$)	S_{nf}	2.02	Potential Hazard
Transition Region ($R_{nf} < R_{tz} < R_{ff}$)	S_{tz}	2.02	Potential Hazard
Between Antenna and Ground	S_g	0.53	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

Conclusions

Based upon the above analysis, it is concluded that FCC RF Guidelines have been exceeded in the Near Field, the Transition Zone, and the region between the Antenna and the Ground of the Uncontrolled (Table 4) environment. In the Controlled (Table 5) environments Near Field, and the Transition Zone, have levels that exceed the FCC RF Guidelines. The applicant proposes to comply with the Maximum Permissible Exposure (MPE) limits of 0.2667 mW/cm² for the Uncontrolled Areas, and the MPE limits of 1.33 mW/ cm² for the Controlled Areas.

The earth station Yagi antenna will be mounted on a secured building with access controls for the general public; so the applicant agrees that the antenna will be in an area secured from the public and worker personnel not familiar with the earth station system. Non-assigned worker personnel and the general public must be accompanied by knowledgeable earth station personnel when they enter the earth station secured area. Furthermore, safety procedures and/or interlocks will be implemented to assure that when this area is accessed by authorized personnel that RF emission will either be completely disabled or reduced to level to acceptable levels.¹

The earth station's secured area will be marked with the required radiation hazard signs as described in the recent FCC R&O 13-39. The area in the vicinity of the earth station secured area will also have signs to inform those in the general population and those who may be working in the area or otherwise present that they are close to a RF System capable of producing hazardous levels.

The applicant agrees to abide by the conditions specified in Condition 5208 provided below:

Condition 5208 - The licensee shall take all necessary measures to ensure that the antenna does not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 CFR 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Compliance can be accomplished in most cases by appropriate restrictions such as fencing.

Requirements for restrictions can be determined by predictions based on calculations, modeling or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for worker.

¹ Reducing the maximum transmit RF power by 50% would bring all power density levels below the MPE limits for controlled areas. Given the abundance of link margin during normal operations, this 3dB power reduction would still support RF checkout, calibration, and most operational scenarios.

II. Compliance with Orbital Debris and Deorbit Related Requirements

Assessment has been made for the Three Diamond Satellites for compliance with the requirements of §25.114(d)(14):

(i) The Three Diamonds satellite deployment planning and operational design was assessed to determine compliance with orbital debris release requirements. The Three Diamonds satellites are deployed from a qualified ISIS Quadpack system. The operational design of the Three Diamonds satellite does not include release of any debris during operations in any mission phase.

An assessment of the probability of the space station becoming a source of debris by collisions with small debris or meteoroids was performed using the NASA Debris Assessment Software (DAS), version 2.0.2. The Three Diamonds satellite was found to be compliant with the requirement (NS 8719.14 Requirement 4.5-2, Probability of Damage from Small Objects). Figure 1 below shows the DAS summary output screen.

(ii) The Three Diamonds satellite design has been assessed and found that the design limits the probability of accidental explosions during and after completion of mission operations. The only energy sources on board the satellite are the Li-Ion battery and the reaction wheel. Both are planned to be passivated at the end of mission. The Three Diamonds satellites have no propulsion systems, and hence have no residual fuel at end of mission.

(iii) The Three Diamonds satellite design has been assessed and found that the probability of the space station becoming a source of debris by collisions with large debris or other operational space stations is compliant with the requirement (NS 8719.14 Requirement 4.5-1, Probability of Collision with Large Objects). Figure 1 below shows the DAS summary output screen.

The anticipated evolution over time of the orbit of the Three Diamonds satellites has been assessed with DAS. The predicted orbital lifetime of the satellites is 5.3 years until re-entry into the atmosphere. The DAS orbital evolution is shown in Figure 2 below.

(iv) For the Three Diamonds satellites, the post-mission disposal plans at end of life are to rely on the natural orbital evolution, as shown in Figure 2 below, to culminate in atmospheric re-entry. As the satellites have no propulsion system, there is no fuel or other active propulsive means employed during deorbit.

For the Three Diamonds Satellites, a casualty risk assessment was performed because the planned post-mission disposal involves atmospheric re-entry. DAS analysis was performed as shows the satellites to be compliant with the requirement (NS 8719.14 Requirement 4.7-1, Casualty Risk from Reentry Debris).

Assessment of the Three Diamonds Satellites using DAS has shown the design and operational planning to be compliant with all requirements as shown in Figure 1 below. Note that compliance with Requirement 4.3-2, Mission-Related Debris Passing Near GEO, does not pertain to the Three Diamonds Satellites as they will not approach GEO orbits. Figure 1 also

shows compliance with Requirement 4.4-3, Long Term Risk from Planned Breakups, because there are no planned breakups for these satellites. Compliance with Requirement 4.8-1, Collision Hazards with Space Tethers, does not pertain to the Three Diamonds Satellites as they do not employ tethers.

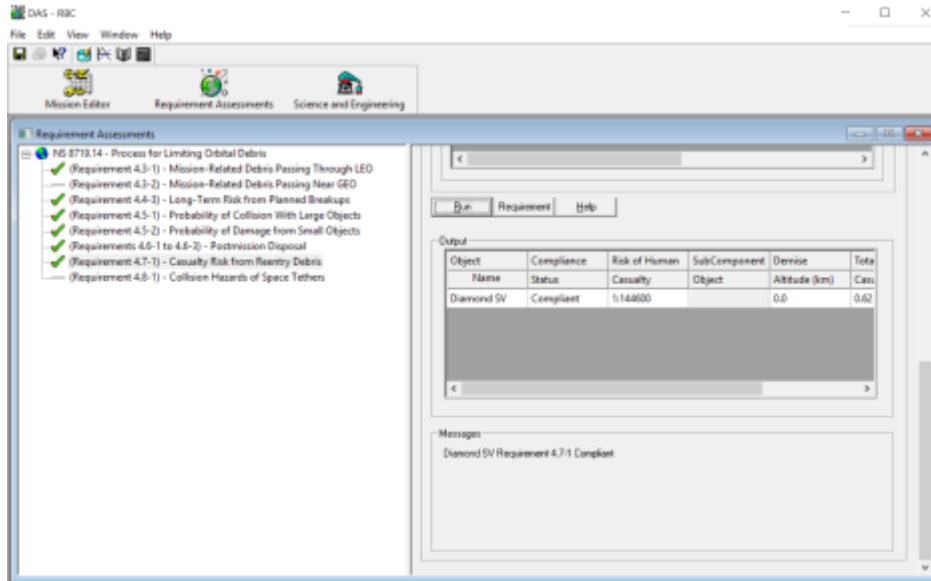


Figure 1 - Debris Assessment Software Requirements Compliance

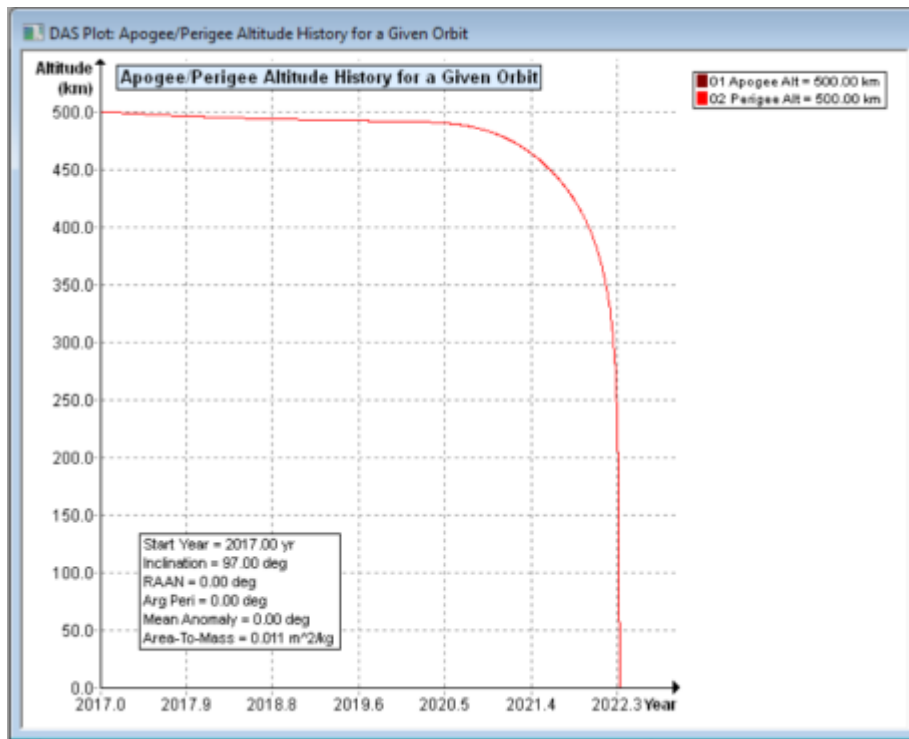


Figure 2 - DAS Orbit Evolution

III. Link Budgets

UHF Link - Uplink

Link parameters		Unit	Notes
Carrier Frequency	399.938	MHz	
Carrier wavelength	0.75	m	
Boltzmann constant	-228.6	dBW/K/Hz	
BASIC PARAMETERS			
Orbit height	500	km	
Earth radius	6371	km	
Horizon height	0	°	
Tx-Rx distance	2573	km	
Ground Segment			
Antenna Gain	17.0	dBi	<i>Dual Crossed Yagis</i>
Tx RF power	25.0	W	
Tx losses	1.6	dB	<i>Cable and connector</i>
Tx EIRP	29.4	dBW	
PROPAGATION			
GS antenna pointing loss	0.5	dB	
Polarization losses	3.0	dB	<i>Worst-case</i>
Free space losses	152.7	dB	
Atmospheric Losses	2.1	dB	
Ionospheric losses	0.4	dB	
Total Propagation Losses	158.7	dB	
Satellite Segment			
Satellite Antenna Pointing Loss	0.0	dB	
Antenna Gain	0.0	dBi	
Spacecraft Tx line losses	0.2	dB	
Antenna Temperature	150	K	<i>Earth is half of F.o.V.</i>
Satellite Noise Temperature	500	K	<i>Estimate</i>
System Noise Temperature	650.0	K	
System Noise Temperature	28.1	dBK	
Rx G/T	-28.3	dB/K	
Final C/No	71.0	dBHz	

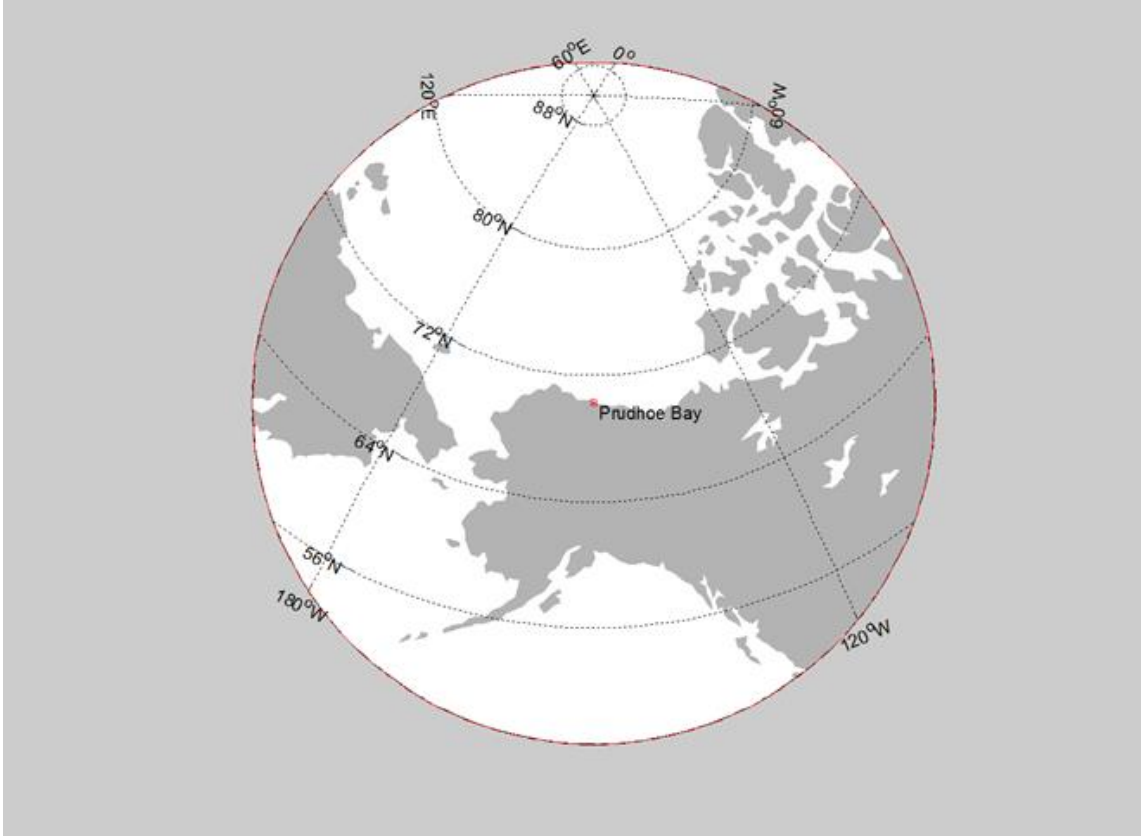
Receive Channel Bandwidth	7.2	kHz	<i>typically 1.5x bit rate</i>
Useful bitrate	4.8	kBit	
Required Eb/No	4.8	dB	<i>GMSK, Conv. R=1/2, K=7 & R.S. (255,223)</i>
Receiver Implementation Loss	3.0	dB	<i>Demodulator phase offset</i>
C/No required	46.37	dBHz	
MARGIN A → B	24.59	dB	

UHF Link - Downlink

Link parameters		Unit	Notes
Carrier Frequency	401.50	MHz	401 - 402 MHz
Carrier wavelength	0.75	m	
Boltzmann constant	-228.6	dBW/K/Hz	
BASIC PARAMETERS			
Orbit height	500	km	
Earth radius	6371	km	
Horizon height	0	°	
Tx-Rx distance	2573	km	
Satellite Segment			
Tx antenna gain	0.0	dBi	
Tx RF power	1.0	W	
Tx losses	0.5	dB	<i>Cable and connector</i>
Tx EIRP	-0.5	dBW	
PROPAGATION			
Satellite Antenna Pointing Loss	0.0	dB	
Polarization Loss	3.0	dB	<i>Worst-case</i>
Free space losses	152.7	dB	
Atmospheric Loss	2.1	dB	
Ionospheric Loss	0.4	dB	
Total Propagation Losses	158.2	dB	
Ground Segment			
GS Antenna Pointing Loss	0.5	dB	
Antenna Gain	17.0	dBi	<i>Dual Crossed Yagis</i>
GS Transmission Line Losses	0.5	dB	
Antenna Temperature	170	K	<i>Worst-case at 0° elevation</i>
Ground Noise Temperature	300	K	<i>Estimate</i>
System Noise Temperature	470.0	K	
System Noise Temperature	26.7	dBK	
Rx G/T	-10.7	dB/K	
Final C/No	59.2	dBHz	

Receive Channel Bandwidth	28.8	kHz	<i>typically 1.5x bit rate</i>
Useful bitrate	19.2	kBit	
Required Eb/No	4.80	dB	<i>GMSK, Conv. R=1/2, K=7 & R.S. (255,223)</i>
Receiver Implementation Loss	3.00	dB	<i>Demodulator phase offset</i>
C/No required	52.39	dBHz	
MARGIN A → B	6.76	dB	

IV. TT&C Contours Map



Note that the contours at 2 dB below peak fall entirely beyond the edge of the visible Earth.

V. Draft FCC Form 312 Schedule B

Approved by OMB
3060-0678

Date & Time Filed:
File Number: ---
Callsign/Satellite ID:

APPLICATION FOR EARTH STATION AUTHORIZATIONS	FCC Use Only
FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	

APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:
DRAFT APPLICATION (60-Day STA for TT&C)

1-8. Legal Name of Applicant			
Name:	RBC Signals, LLC	Phone Number:	404-803-7734
DBA Name:		Fax Number:	
Street:	2205 152nd Ave NE	E-Mail:	crichins@rbcsignals.com
City:	Redmond	State:	WA
Country:	USA	Zipcode:	98052 -
Attention:	Mr. Christopher Richins		

9-16. Name of Contact Representative			
Name:	Carlos Nalda	Phone Number:	5713325626
Company:	LMI Advisors	Fax Number:	
Street:	2550 M Street NW Suite 345	E-Mail:	cnalda@lmiadvisors.com
City:	Washington	State:	DC
Country:	USA	Zipcode:	20037-
Attention:	Mr. Carlos Nalda	Relationship:	Other

CLASSIFICATION OF FILING

<p>17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b.</p> <p>a.</p> <p><input checked="" type="radio"/> a1. Earth Station (N/A) a2. Space Station</p>	<p>b.</p> <p><input checked="" type="radio"/> b1. Application for License of New Station</p> <p><input type="radio"/> b2. Application for Registration of New Domestic Receive-Only Station (N/A) b3. Amendment to a Pending Application (N/A) b4. Modification of License or Registration (N/A) b5. Assignment of License or Registration (N/A) b6. Transfer of Control of License or Registration (N/A) b7. Notification of Minor Modification (N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite (N/A) b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States</p> <p><input type="radio"/> b10. Other (Please specify)</p> <p><input type="radio"/> b11. Application for Earth Station to Access a Non-U.S.satellite Not Currently Authorized to Provide the Proposed Service in the Proposed Frequencies in the United States.</p>
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17c. Is a fee submitted with this application?
 If Yes, complete and attach FCC Form 159.

If No, indicate reason for fee exemption (see 47 C.F.R.Section 1.1114).
 Governmental Entity Noncommercial educational licensee
 Other(please explain):

17d.
Fee Classification BAX - Fixed Satellite Transmit/Receive Earth Station

18. If this filing is in reference to an	19. If this filing is an amendment to a pending application enter:
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existing station, enter: (a) Call sign of station: Not Applicable	(a) Date pending application was filed: Not Applicable	(b) File number of pending application: Not Applicable
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TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:

a. Fixed Satellite
 b. Mobile Satellite
 c. Radiodetermination Satellite
 d. Earth Exploration Satellite
 e. Direct to Home Fixed Satellite
 f. Digital Audio Radio Service
 g. Other (please specify)
Space Operations

21. STATUS: Choose the button next to the applicable status. Choose only one.
 Common Carrier Non-Common Carrier

22. If earth station applicant, check all that apply.
 Using U.S. licensed satellites
 Using Non-U.S. licensed satellites

23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:
 Connected to a Public Switched Network Not connected to a Public Switched Network N/A

24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s).
 a. C-Band (4/6 GHz) b. Ku-Band (12/14 GHz)
 c. Other (Please specify upper and lower frequencies in MHz.)
Frequency Lower: 399.926 Frequency Upper: 401.25

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.
 a. Fixed Earth Station
 b. Temporary-Fixed Earth Station
 c. 12/14 GHz VSAT Network
 d. Mobile Earth Station
(N/A) e. Geostationary Space Station
(N/A) f. Non-Geostationary Space Station
 g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY: Choose only one.
 Transmit/Receive Transmit-Only Receive-Only N/A

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an 'X' in the box(es) next to all that apply.)
Not Applicable

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as an exhibit to this application. A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments. Yes No

ALIEN OWNERSHIP Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30-34.

29. Is the applicant a foreign government or the representative of any foreign government? Yes No

30. Is the applicant an alien or the representative of an alien? Yes No N/A

31. Is the applicant a corporation organized under the laws of any foreign government? Yes No N/A

32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country? Yes No N/A

33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a

foreign government or representative thereof or by any corporation organized under the laws of a foreign country?

34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.

BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules? Yes No
If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.

36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explanation of circumstances. Yes No

37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explanation of circumstances. Yes No

38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances Yes No

39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhibit, an explanation of the circumstances. Yes No

40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.

41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes. Yes No

42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43. Yes No

42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station? U.K.

43. Description. (Summarize the nature of the application and the services to be provided). RBC Signals seeks 60-day special temporary authorization. See Narrative.

43a. Geographic Service Rule Certification
By selecting A, the undersigned certifies that the applicant is not subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25. A

By selecting B, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will comply with such requirements. B

By selecting C, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will not comply with such requirements because it is not feasible as a technical matter to do so, or that, while technically feasible, such services would require so many compromises in satellite design and operation as to make it economically unreasonable. A narrative description and technical analysis demonstrating this claim are attached. C

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- Individual
- Unincorporated Association
- Partnership
- Corporation
- Governmental Entity
- Other (please specify)
LLC

45. Name of Person Signing Christopher Richins	46. Title of Person Signing CEO
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47. Please supply any need attachments.

Attachment 1:	Attachment 2:	Attachment 3:
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WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

SATELLITE EARTH STATION AUTHORIZATIONS FCC Form 312 - Schedule B:(Technical and Operational Description)

FOR OFFICIAL USE ONLY

Location of Earth Station Site

E1: Site Identifier: RBC-PDB	E5. Call Sign:
E2: Contact Name: Christopher Richins	E6. Phone Number: 650-746-8744
E3. Street: DS12 Access Road	E7. City: Deadhorse
E4. State: AK	E8. County: North Slope Borough
E10. Area of Operation:	E9. Zip Code: 99734
E11. Latitude: 70 ° 12 ' 45.0 " N	E10. Area of Operation: Prudhoe Bay, Alaska
E12. Longitude: 148 ° 24 ' 29.0 " W	
E13. Lat/Lon Coordinates are:	<input type="radio"/> NAD-27 <input checked="" type="radio"/> NAD-83 <input type="radio"/> N/A
E14. Site Elevation (AMSL):	15.0 meters

E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide a technical analysis showing compliance with two-degree spacing policy.	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
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E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements?	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A
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E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	<input checked="" type="radio"/> Yes <input type="radio"/> No
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E18. Is frequency coordination required? If YES, attach a frequency coordination report as	<input type="radio"/> Yes <input checked="" type="radio"/> No
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E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as	<input type="radio"/> Yes <input checked="" type="radio"/> No
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E20. FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.	<input type="radio"/> Yes <input checked="" type="radio"/> No
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POINTS OF COMMUNICATION

Satellite Name:OTHER OTHER If you selected OTHER, please enter the following:	
E21. Common Name: 3 Diamonds	E22. ITU Name:
E23. Orbit Location: NGSO MSS	E24. Country: United Kingdom

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier: RBC-PDB	E27. Country:USA
E26. Common Name:	

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size	E41/42. Antenna Gain Transmint and/or Recieve(____dBi at ____GHz)
RBC-PDB	RBC-PDB1	1	M2 Antenna Systems	400CP30A	3.57	17.0 dBi at 0.400

E28. Antenna Id	E33/34. Diameter Minor/Major(meters)	E35. Above Ground Level (meters)	E36. Above Sea Level (meters)	E37. Building Height Above Ground Level (meters)	E38. Total Input Power at antenna flange (Watts)	E39. Maximum Antenna Height Above Rooftop (meters)	E40. Total EIRP for al carriers (dBW)
RBC-PDB1	0.025/3.57	25.0	15.0	0.0	12.53	0.0	28.0

FREQUENCY

E28. Antenna Id	E43/44. Frequency Bands(MHz)	E45. T/R Mode	E46. Antenna Polarization(H,V,L,R)	E47. Emission Designator	E48. Maximum EIRP per Carrier(dBW)	E49. Maximum EIRP Density per Carrier(dBW/4kHz)
RBC-PDB1	401.05 401.25	R	Right Hand Circular	16K5G1D	0.0	0.0

E50. Modulation and Services TT&C

RBC-PDB1	401.05 401.25	R	Right Hand Circular	1K03G1D	0.0	0.0
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E50. Modulation and Services TT&C

RBC-PDB1	401.05 401.25	R	Right Hand Circular	4K13G1D	0.0	0.0
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E50. Modulation and Services TT&C

RBC-PDB1	401.05 401.25	R	Right Hand Circular	8K26G1D	0.0	0.0
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E50. Modulation and Services TT&C

RBC-PDB1	399.926 399.950	T	Right Hand Circular	16K5G1D	28.0	21.83
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E50. Modulation and Services TT&C

RBC-PDB1	399.926 399.950	T	Right Hand Circular	1K03G1D	28.0	28.0
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E50. Modulation and Services TT&C

RBC-PDB1	399.926 399.950	T	Right Hand Circular	4K13G1D	28.0	27.84
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E50. Modulation and Services TT&C

RBC-PDB1	399.926 399.950	T	Right Hand Circular	8K26G1D	28.0	24.83
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E50. Modulation and Services TT&C

FREQUENCY COORDINATION

E28. Antenna	E51. Satellite Orbit Type	E52/53. Frequency	E54/55. Range	E56. Earth	E57. Antenna	E58. Earth	E59. Antenna	E60. Maximum EIRP Density
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Id		Limits(MHz)	of Satellite Arc E/W Limit	Station Azimuth Angle Eastern Limit	Elevation Angle Eastern Limit	Station Azimuth Angle Western Limit	Elevation Angle Western Limit	toward the Horizon(dBW/4kHz)
RBC-PDB1	Non-Geostationary	401.05 401.25	0.0/ 0.0	0.0	5.0	360.0	5.0	0.0
	Non-Geostationary	399.926 399.950	0.0/ 0.0	0.0	5.0	360.0	5.0	28.0

REMOTE CONTROL POINT LOCATION
REMOTE CONTROL POINT LOCATION

E61. Call Sign NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.		E65. Phone Number 650-746-8744	
E62. Street Address 2205 152nd Street NE			
E63. City Redmond		E67. County King	
		E64/68. State/Country WA/ USA	E66. Zip Code 98052

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

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VI. Technical Certification

I, David Morse, hereby certify that I am the technically qualified person responsible for the preparation of the technical information contained in the RBC Signals 60-Day STA application for TT&C operating authority and the accompanying Technical Appendix, that I am familiar with Part 25 of the Commission's Rules (47 C.F.R. Part 25), and that I have either prepared or reviewed the technical information submitted in this application and found it to be complete and accurate to the best of my knowledge and belief.

By: /s/David Morse

Title: VP, Communication Systems
Avaliant, LLC

Date: June 13, 2017