

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATION Enter a description of this application to identify it on the main menu:  
60-Day STA to provide TT&C

1. 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



File # SES-STA-20180307-00202

Call Sign N/A Grant Date 4/12/2018  
(or other identifier)

Term Dates

From 6/1/2018 To: July 31, 2018


Approved: Paul E. Hinch

Applicant: RBC Signals, LLC  
Call Sign:  
File No.: SES-STA-20180307-00202

RBC Signals LLC (RBC), is granted special temporary authorization for 60-days, beginning June 1, 2018, to operate an M2 Antenna Systems Yagi antenna at its facility in Boulder, CO to provide tracking, telemetry and command (TT&C) services for the Analytical Space, Inc.'s ("ASI") Radix experimental cube sat<sup>1</sup> in the 401.24-401.36 MHz band (Earth-to-space/space-to-Earth) frequency band under the following conditions:

1. All operations must comply the agreement with the Table Mountain Frequency Manager dated March 29, 2017.
2. Operations shall not cause harmful interference to, and shall not claim protection from, interference caused to it by any other lawfully operating station and it shall cease transmission(s) immediately upon notice of such interference.
3. Uplink operations from the M2 Antenna Systems Yagi antenna to the Radix CubeSat shall not occur when the NASA International Space Station (ISS) (NORAD designation 25544 or international spacecraft ID 1998-067A) is within the horizon to horizon view of the RBC signals facility in Boulder, Colorado.
4. Grant of this authorization is without prejudice to any determination that the Commission may make regarding any pending or future applications for this site.
5. Any action taken or expense incurred as a result of operations pursuant to this special temporary authority is solely at RBC's risk.
6. Grant of this STA is without prejudice to any determination that the Commission may make regarding any pending or future applications.

This grant is issued pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective upon release.

 <b>GRANTED</b> International Bureau	File # <u>SES-STA-20180307-00202</u>
	Call Sign <u>N/A</u> Grant Date <u>4/12/2018</u> (or other identifier)
	Term Dates From <u>6/1/2018</u> To <u>7/31/2018</u>
	Approved: <u>[Signature]</u>

<sup>1</sup> The Radix cube sat was authorized under FCC experimental license 0044-EX-ST-2017

<b>2. Contact</b>			
<b>Name:</b>	Carlos Nalda	<b>Phone Number:</b>	5713325626
<b>Company:</b>	LMI Advisors	<b>Fax Number:</b>	
<b>Street:</b>	2550 M Street NW, Suite 345 Suite 345	<b>E-Mail:</b>	cnalda@lmiadvisors.com
<b>City:</b>	Washington	<b>State:</b>	DC
<b>Country:</b>	USA	<b>Zipcode:</b>	20037 -
<b>Attention:</b>		<b>Relationship:</b>	Other
(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)			
3. Reference File Number or Submission ID			
4a. Is a fee submitted with this application?			
<input checked="" type="radio"/> If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).			
<input type="radio"/> Governmental Entity <input type="radio"/> Noncommercial educational licensee			
<input type="radio"/> Other (please explain):			
4b. Fee Classification CGX – Fixed Satellite Transmit/Receive Earth Station			
5. Type Request			
<input checked="" type="radio"/> Use Prior to Grant <input type="radio"/> Change Station Location <input type="radio"/> Other			
6. Requested Use Prior Date			
05/01/2018			
7. City/Longmont		8. Latitude	
		(dd mm ss.s h) 40 8 10.6 N	

9. State CO	10. Longitude (dd mm ss.s h) 105 12 47.0 W
11. Please supply any need attachments. Attachment 1: Technical Appendix      Attachment 2: Narrative      Attachment 3:	
12. Description. (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">60-day STA for TT&amp;C.</div>	
13. 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"; party to the application; for these purposes. <p style="text-align: right;">Yes <input checked="" type="radio"/>      No <input type="radio"/></p>	
14. Name of Person Signing Christopher Richins	15. Title of Person Signing CEO
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).	

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**THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104-13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.**

**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.: SES-STA-_____
("TT&C") to a U.S. Cubesat	)	

*Expedited Consideration Requested*

**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 Yagi antenna (the "400 MHz Yagi") at a facility in Boulder, Colorado to communicate with a U.S.-licensed low-Earth orbit ("LEO") cubesat to perform tracking, telemetry and command ("TT&C") for housekeeping, orientation and subsystem control. RBC Signals seeks to commence these short-term TT&C operations on May 1, 2018, to ensure the timely initiation of TT&C operations following the satellite's scheduled launch on that date. Moreover, RBC Signals requests expedited consideration and grant as soon as practicable to support the associated space station license application pending with the Commission.<sup>1</sup>

**I. BACKGROUND**

RBC Signals is a Seattle, Washington-based satellite services company that provides earth station services around the world. RBC Signals currently holds multiple STAs to provide similar TT&C support for various LEO non-geostationary satellite orbit satellite ("NGSO") cubesats from

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<sup>1</sup> See Analytical Space, Inc., File No. 0044-EX-ST-2017, Call Sign WL9XLY ("*Radix Experimental Application*").

a facility in Deadhorse, Alaska using the 400 MHz Yagi.<sup>2</sup> RBC Signals plans to seek long-term commercial authority to support its operations from the Boulder facility, which will be similar to its ongoing Deadhorse operations.

Here, RBC Signals seeks short-term authority to conduct TT&C operations for the proposed Radix experimental cubesat, a U.S. satellite that was developed by Analytical Space, Inc. (“ASI”) to demonstrate ASI’s optical-based data relay network technology. The Radix cubesat is currently the subject of an experimental license application with the Commission,<sup>3</sup> which will allow ASI to analyze the technical feasibilities of its optical communication technology. Here, RBC Signals seeks authority to conduct short-term TT&C following the Radix satellite’s planned launch on May 1, 2018, as a secondary payload aboard Orbital Sciences’ CRS Cygnus OA-9E from Kennedy Space Center.<sup>4</sup> The Radix cubesat will be launched into a nominal 400 km circular, sun-synchronous orbit with an inclination from the equator of approximately 51.6°.

This 60-day STA will cover initial TT&C for the Radix cubesat and RBC Signals plans to file an application for longer-term authority for the operations sought herein. To the extent applicable, RBC Signals incorporates by reference the satellite technical specifications and mission overview information previously provided by ASI in the *Radix Experimental Application* and will perform the proposed TT&C operations consistent with the terms and conditions imposed by the Commission in any grant issued to ASI. Grant of this STA request is in the public interest because it will ensure the timely initiation of TT&C for these novel and important cubesat operations and

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<sup>2</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>3</sup> *Supra* n.1.

<sup>4</sup> *Id.*, Radix Technical Description.

facilitate the safe operation of the Radix cubesat during these critical strategic evaluations.

## II. DISCUSSION

RBC Signals seeks to operate the 400 MHz Yagi with the proposed Radix cubesat in the 401.24-401.36 MHz band (Earth-to-space/space-to-Earth). As discussed below, RBC Signals has examined other operations in the subject bands and ensures that the proposed TT&C operations will not cause interference to current or future U.S. government users of the band. RBC Signals has commenced coordination with Federal government operations and will ensure that the short-term and longer-term interests of the United States are fully accommodated.

### A. 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 and space operations services. RBC Signals seeks to perform TT&C uplink and downlink operations in frequencies from 401.24-401.36 MHz consistent with the co-primary space operations allocation in this band.<sup>5</sup> RBC Signals understands that there are certain U.S. government meteorological aids and earth exploration operations conducted in the 401-402 MHz band.<sup>6</sup> Specifically, RBC Signal’s proposed operations are within a 1.5 mile radius of the National Oceanic Atmospheric Administration (“NOAA”) Table Mountain Radio Receiving Zone, which is a designated “quiet zone” under the Commission’s rules.<sup>7</sup> Accordingly, RBC Signals has commenced coordination with the regional frequency manager to minimize possible interference

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<sup>5</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>6</sup> See [https://www.ntia.doc.gov/files/ntia/publications/compendium/0401.00-0402.00\\_01MAR14.pdf](https://www.ntia.doc.gov/files/ntia/publications/compendium/0401.00-0402.00_01MAR14.pdf).

<sup>7</sup> 47 C.F.R. § 1.924(b) (“Coordination is recommended for . . . stations located within 2.4 kilometers (1.5 miles) of the Table Mountain Radio Receiving Zone.”).



to the NOAA Table Mountain facility. Based on our research and coordination efforts to date, RBC Signals believes the proposed TT&C operations in this band will not present a potential for interference into other users of this band. 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. RBC Signals will inform the Commission upon completion of coordination and will update this 60-day STA application filing accordingly.

### **B. STA Request & 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 seeks an expedited grant date but a commencement date of May 1, 2018, following the launch of the Radix satellite. 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 to permit continuing TT&C operations for the Radix cubesat from the Boulder facility.

This STA request is in the public interest because it will ensure that RBC Signals is able to commence TT&C in time for the launch of the Radix satellite and assist ASI in demonstrating the significant benefits of its satellite communication technology. Moreover, this STA is necessary to support the *Radix Experimental Application* and ensure that ASI can secure appropriate Commission authority prior to the satellite's launch. The requested expedited grant is vital to ASI's associated space station license application and will provide additional time for ASI to finalize its operation strategies. 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.

### **III. CONCLUSION**

In view of the foregoing, the public interest would be served by expedited grant of a 60-day STA to support grant of the underlying experimental satellite application and ultimately to allow RBC Signals to perform TT&C for the Radix cubesat commencing on May 1, 2018.

**TECHNICAL APPENDIX**

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

- I. 400 MHz Yagi Radiation Hazard Report
- II. Draft FCC Form 312 Schedule B

# Radiation Hazard Study

## 400 MHz Earth Station

This study analyzes the non-ionizing radiation levels for a 400 MHz Yagi tracking earth station. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, Edition 97-01.

Bulletin No. 65 specifies that there are two separate tiers of exposure limits that are depending on the area of exposure and/or the status of the individuals who are subject to the exposure -- the General Population/Uncontrolled Environment and the Controlled Environment, where the general population cannot access.

The maximum level of non-ionizing radiation to which individuals may be exposed is limited to a power density level of 1.33 milliwatts per square centimeter ( $1.33 \text{ mW/cm}^2$ ) averaged over any 6 minute period in a controlled environment, and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 0.27 milliwatt per square centimeter ( $0.27 \text{ mW/cm}^2$ ) averaged over any 30 minute period in a uncontrolled environment.

In the normal range of transmit powers for satellite antennas, the power densities at or around the antenna surface are expected to exceed safe levels. The purpose of this study is to determine the power flux density levels for the earth station under study as compared with the MPE limits. This comparison is done in each of the following regions:

1. Far-field region
2. Near-field region
3. Transition region
4. The region between the antenna edge and the ground

### Input Parameters

The following input parameters were used in the calculations:

<u>Parameters:</u>	<u>Value</u>	<u>Unit</u>	<u>Symbol</u>
<i>Antenna Diameter</i>	3.57	m	<i>D</i>
<i>Antenna Transmit Gain</i>	16.2	dBi	<i>G</i>
<i>Transmit Frequency</i>	400	MHz	<i>f</i>
<i>Power Input to the Antenna</i>	12.53	W	<i>P</i>

### Calculated Parameters:

The following values were calculated using the above input parameters and the

corresponding formulas:

<u>Parameter</u>	<u>Value</u>	<u>Unit</u>	<u>Symbol</u>	<u>Formula</u>
<i>Antenna Surface Area</i>	1.964	m <sup>2</sup>	<i>A</i>	$G\lambda^2/(4\pi)/\lambda$
<i>Antenna Efficiency</i>	0.95		$\eta$	$G\lambda^2/(\pi^2 D^2)$
<i>Gain Factor</i>	41.7		<i>g</i>	$10^{G/10}$
<i>Wavelength</i>	0.75	m	$\lambda$	$300/f$

### **Behavior of EM Fields as a Function of Distance**

The behavior of the characteristics of EM fields varies depending on the distance from the radiating antenna. These characteristics are analyzed in three primary regions: the near-field region, the far-field region and the transition region. Of interest also is the region between the antenna and ground.

For yagi antennas with circular cross sections, such as the antenna under study, the near-field, far-field and transition region distances are calculated as follows:

<u>Parameter</u>	<u>Value</u>	<u>Unit</u>	<u>Formula</u>
<i>Near-Field Distance</i>	4.25	m	$R_{nf} = D^2/(4\lambda)$
<i>Distance to Far-Field</i>	10.2	m	$R_{ff} = 0.60D^2/(\lambda)$
<i>Distance of Transition Region</i>	4.25	m	$R_t = R_{nf}$

The distance in the transition region is between the near and far fields. Thus,  $R_{nf} \leq R_t \leq R_{ff}$ . However, the power density in the transition region will not exceed the power density in the near-field. Therefore, for purposes of the present analysis, the distance of the transition region can equate the distance to the near-field.

### **Power Flux Density Calculations**

The power flux density is considered to be at a maximum through the entire length of the near-field. This region is contained within a cylindrical volume with a diameter, *D*, equal to the diameter of the antenna. In the transition region and the far-field, the power density decreases inversely with the square of the distance. The following equations are used to calculate power density in these regions.

<u>Parameter</u>	<u>Value</u>	<u>Unit</u>	<u>Symbol</u>	<u>Formula</u>
<i>Power Density in the Near-Field</i>	2.42	mW/cm <sup>2</sup>	$S_{nf}$	$16.0 \eta P/(\pi D^2)$
<i>Power Density in the Far-Field</i>	0.04	mW/cm <sup>2</sup>	$S_{ff}$	$GP/(4\pi R_{ff}^2)$
<i>Power Density in the Transition Region</i>	2.42	mW/cm <sup>2</sup>	$S_t$	$S_{nf} R_{nf}/(R_t)$

The power density between the antenna and ground, is calculated as follows:

<u>Parameter</u>	<u>Value</u>	<u>Unit</u>	<u>Symbol</u>	<u>Formula</u>
<i>Power Density b/w Reflector and Ground</i>	0.64	mW/cm <sup>2</sup>	$S_g$	$P/A$

The below table summarizes the calculated power flux density values for each region. In a controlled environment, the only regions that exceed FCC limitations are shown below.

These regions are only accessible by trained technicians who, as a matter of procedure, turn off transmit power before performing any work in these areas.

<u>Power Density</u>	<u>Value</u>	<u>Unit</u>	<u>Controlled Environment</u>
<i>Far Field Calculation</i>	0.04	mW/cm <sup>2</sup>	Satisfies FCC MPE
<i>Near Field Calculation</i>	2.42	mW/cm <sup>2</sup>	Exceeds Limits
<i>Transition Region</i>	2.42	mW/cm <sup>2</sup>	Exceeds Limits
<i>Region b/w Antenna &amp; Ground</i>	0.64	mW/cm <sup>2</sup>	Satisfies FCC MPE

In conclusion, the results show that the antenna, in a controlled environment, may exist in the regions noted above and applicant will take the proper mitigation procedures to ensure it meets the guidelines specified in 47 C.F.R. § 1.1310.

The earth station will be marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth station to inform the general population, who might be working or otherwise present in or near the path of the main beam.

The applicant will ensure that the main beam of the antenna will be pointed at least one diameter away from any building, or other obstacles in those areas that exceed the MPE limits. Since one diameter removed from the center of the main beam the levels are down at least 20 dB, or by a factor of 100, public safety will be ensured.

Finally, the earth station's operational personnel will not have access to areas that exceed the MPE limits while the earth station is in operation. The transmitter will be turned off during periods of maintenance so that the MPE standard of 1.33 mW/cm<sup>2</sup> will be complied with for those regions in close proximity to the antenna, which could be occupied by operating personnel.

Approved by OMB  
3060-0678

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

<b>APPLICATION FOR EARTH STATION AUTHORIZATIONS</b>	<b>FCC Use Only</b>
<b>FCC 312 MAIN FORM FOR OFFICIAL USE ONLY</b>	

**APPLICANT INFORMATION**

Enter a description of this application to identify it on the main menu:  
**DRAFT FORM TO SUPPORT 60-DAY STA REQUEST (AS)**

<b>1-8. Legal Name of Applicant</b>			
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			
<b>9-16. Name of Contact Representative</b>			
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 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 checked="" 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>
<p>17c. Is a fee submitted with this application?</p> <p><input type="radio"/> If Yes, complete and attach FCC Form 159.</p> <p>If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).</p> <p><input type="radio"/> Governmental Entity   <input type="radio"/> Noncommercial educational licensee</p> <p><input checked="" type="radio"/> Other (please explain): DRAFT FORM</p>	
<p>17d. Fee Classification</p>	
<p>18. If this filing is in reference to an</p>	<p>19. If this filing is an amendment to a pending application enter:</p>

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
-------------------------------------------------------------------------	-----------------------------------------------------------	-----------------------------------------------------------

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)  
 NGSO

21. STATUS: Choose the button next to the applicable status. Choose only one. <input checked="" type="radio"/> Common Carrier <input checked="" type="radio"/> Non-Common Carrier	22. If earth station applicant, check all that apply. <input checked="" type="checkbox"/> Using U.S. licensed satellites <input type="checkbox"/> 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: 401.24 Frequency Upper: 401.36

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  Yes  No  N/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?

43. Description. (Summarize the nature of the application and the services to be provided). Draft Form to support 60-day STA request to provide TT&C for Analytical Space cubesat.

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:	UHF-Boulder	E5. Call Sign:	
E2. Contact Name	Zachary Reich	E6. Phone Number:	415-622-5548
E3. Street:	6075 Prospect Road	E7. City:	Longmont
E4. State	CO	E8. County:	Boulder
E10. Area of Operation:		E9. Zip Code	80503
E11. Latitude:	40 ° 8 ' 10.6 " N	E10. Area of Operation:	Boulder, CO
E12. Longitude:	105 ° 12 ' 47.0 " 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
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
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
E18. Is frequency coordination required? If YES, attach a frequency coordination report as	<input type="radio"/> Yes <input checked="" type="radio"/> No
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
<b>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?</b> <b>FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.</b>	<input type="radio"/> Yes <input checked="" type="radio"/> No

**POINTS OF COMMUNICATION**

Satellite Name: OTHER   OTHER   If you selected OTHER, please enter the following:	
E21. Common Name: Radix	E22. ITU Name:
E23. Orbit Location: NGSO	E24. Country: USA

**POINTS OF COMMUNICATION (Destination Points)**

E25. Site Identifier: UHF-Boulder	
E26. Common Name:	E27. Country: USA

**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)
UHF-Boulder	YAGI-1	1	M2 Antenna Systems	400CP30A	3.57	16.2 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)
YAGI-1	0.025/3.57	15.0	0.0	0.0	12.53	0.0	27.2

**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)
YAGI-1	401.24 401.36	R	Right Hand Circular	114KG1D	0.0	0.0

**E50. Modulation and Services TT&C Downlink**

YAGI-1	401.24 401.36	T	Right Hand Circular	114KG1D	27.2	12.6
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**E50. Modulation and Services TT&C Uplink**

**FREQUENCY COORDINATION**

E28. Antenna Id	E51. Satellite Orbit Type	E52/53. Frequency Limits(MHz)	E54/55. Range of Satellite Arc E/W Limit	E56. Earth Station Azimuth Angle Eastern Limit	E57. Antenna Elevation Angle Eastern Limit	E58. Earth Station Azimuth Angle Western Limit	E59. Antenna Elevation Angle Western Limit	E60. Maximum EIRP Density toward the Horizon(dBW/4kHz)
YAGI-1	Non-Geostationary	401.24 401.36	0.0/ 0.0	0.0	5.0	360.0	5.0	0.0
	Non-Geostationary	401.24 401.36	0.0/ 0.0	0.0	5.0	360.0	5.0	12.6

**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
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E62. Street Address 2205 152nd Street NE
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E63. City Redmond	E67. County King	E64/68. State/Country WA/ USA	E66. Zip Code 98052
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**FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT**

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