

Approved by OMB
3060-0678

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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:
WMLS Grand Marais new earth station

1-8. Legal Name of Applicant	
Name: Minnesota Public Radio	Phone Number: 651-290-1500
DBA Name:	Fax Number: 651-290-1188
Street: 480 Cedar Street	E-Mail: fccfiling@mpr.org
City: Saint Paul	State: MN
Country: USA	Zipcode: 55101 -
Attention: Rocky Rothrock	

9-16. Name of Contact Representative	
Name: Melodie Virtue	Phone Number: 202-298-2527
Company: Garvey Schubert Barer	Fax Number: 202-965-1729
Street: 1000 Potomac Street NW Suite 200	E-Mail: mvirtue@gsblaw.com
City: Washington	State: DC
Country: USA	Zipcode: 20007-
Attention:	Relationship: Legal Counsel

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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<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 checked="" type="radio"/> Noncommercial educational licensee</p> <p><input type="radio"/> Other (please explain):</p>
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17d. Fee Classification CMO - Receive Only Earth Station	
18. If this filing is in reference to an existing station, enter: (a) Call sign of station: Not Applicable	19. If this filing is an amendment to a pending application enter: (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:	
<input checked="" type="checkbox"/> a. Fixed Satellite <input type="checkbox"/> b. Mobile Satellite <input type="checkbox"/> c. Radiodetermination Satellite <input type="checkbox"/> d. Earth Exploration Satellite <input type="checkbox"/> e. Direct to Home Fixed Satellite <input type="checkbox"/> f. Digital Audio Radio Service <input type="checkbox"/> g. Other (please specify)	
21. STATUS: Choose the button next to the applicable status. Choose only one. <input checked="" type="radio"/> Common Carrier <input 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: <input type="radio"/> Connected to a Public Switched Network <input type="radio"/> Not connected to a Public Switched Network <input checked="" type="radio"/> N/A	
24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s). <input checked="" type="checkbox"/> a. C-Band (4/6 GHz) <input type="checkbox"/> b. Ku-Band (12/14 GHz) <input type="checkbox"/> c. Other (Please specify upper and lower frequencies in MHz.) Frequency Lower: Frequency Upper:	

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.	
<input checked="" type="radio"/> a. Fixed Earth Station <input type="radio"/> b. Temporary-Fixed Earth Station <input type="radio"/> c. 12/14 GHz VSAT Network <input type="radio"/> d. Mobile Earth Station (N/A) e. Geostationary Space Station (N/A) f. Non-Geostationary Space Station <input type="radio"/> g. Other (please specify)	
26. TYPE OF EARTH STATION FACILITY: Choose only one. <input type="radio"/> Transmit/Receive <input type="radio"/> Transmit-Only <input checked="" type="radio"/> Receive-Only <input type="radio"/> 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
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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. <u>A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments.</u> <input type="radio"/> Yes <input checked="" type="radio"/> No
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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?	<input type="radio"/> Yes <input checked="" type="radio"/> No
30. Is the applicant an alien or the representative of an alien?	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A
31. Is the applicant a corporation organized under the laws of any foreign government?	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> 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? Yes No N/A

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). **Applicant is requesting a new receive only earth station authorization for public radio broadcasting.**

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)

45. Name of Person Signing Nick Kereakos	46. Title of Person Signing Senior Vice President
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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: 1	E5. Call Sign:	
E2: Contact Name Rocky Rothrock	E6. Phone Number:	651-290-1500
E3. Street: 365 Old Ski Hill Road	E7. City:	Grand Marais
	E8. County:	Cook
E4. State MN	E9. Zip Code	55604
E10. Area of Operation:	365 Old Ski Hill Road, Grand Marais, Cook County, MN 55604	
E11. Latitude: 47 ° 46 ' 4.0 " N		
E12. Longitude: 90 ° 20 ' 47.0 " W		
E13. Lat/Lon Coordinates are:	<input checked="" type="radio"/> NAD-27	<input type="radio"/> NAD-83 <input type="radio"/> N/A
E14. Site Elevation (AMSL):	455.0 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 checked="" type="radio"/> Yes <input type="radio"/> No <input 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 type="radio"/> Yes <input type="radio"/> No <input checked="" 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 type="radio"/> Yes <input checked="" type="radio"/> No
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E18. Is frequency coordination required? If YES, attach a frequency coordination report as	<input checked="" type="radio"/> Yes <input 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
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

POINTS OF COMMUNICATION

Satellite Name: GALAXY 16 (S2687) GALAXY 16 99 W.L. If you selected OTHER, please enter the following:	
E21. Common Name:	E22. ITU Name:
E23. Orbit Location:	E24. Country:

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier:	
E26. Common Name:	E27. Country:

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size	E41/42. Antenna Gain Transmitt and/or Recieve(____dBi at ____GHz)		
1	3.7m	1	Prodelin	1374	3.7	42.0 dBi at 3.7		
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)
3.7m	0.0/0.0		3.0	453.0	0.0	0.0	0.0	0.0

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)
3.7m	3700 4200	R	Horizontal and Vertical	150kf3d	0.0	0.0

E50. Modulation and Services NULL

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)
3.7m	Geostationary	3700 4200	95.0/127.0	186.3	34.9	225.1	24.7	0.0

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
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E62. Street Address			
E63. City	E67. County	E64/68. State/Country /	E66. Zip Code

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

The public reporting for this collection of information is estimated to average 0.25 - 24 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection and reduce the burden it causes you, please write to the Federal Communications Commission, AMD-PERF, Paperwork Reduction Project (3060-0678), Washington, DC 20554. We will also accept your comments regarding the Paperwork Reduction Act aspects of this collection via the Internet if you send them to PRA@fcc.gov. PLEASE DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.

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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.

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Minnesota Public Radio (WMLS)
GRAND MARAIS, MN
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
April 22, 2018

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1. CONCLUSIONS

An interference study considering all existing, proposed and prior coordinated microwave facilities within the coordination contours of the proposed earth station demonstrates that this site will operate satisfactorily with the common carrier microwave environment. Further, there will be no restrictions of its operation due to interference considerations.

2. SUMMARY OF RESULTS

There were no great circle interference cases identified during the interference study of the proposed earth station.

3. SUPPLEMENTAL SHOWING

Pursuant to Part 25.203(c) of the FCC Rules and Regulations, the satellite earth station proposed in this application was coordinated by Comsearch using computer techniques and in accordance with Part 25 of the FCC Rules and Regulations.

Coordination data for this earth station was sent to the below listed carriers with a letter dated 04/22/2018.

Company
Auracomm

4. EARTH STATION COORDINATION DATA

This section presents the data pertinent to frequency coordination of the proposed earth station that was circulated to all carriers within its coordination contours.

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 <http://www.comsearch.com>

Date: 04/22/2018
Job Number: 180422COMSTC04

Administrative Information

Licensee Code WMLS
Licensee Name Minnesota Public Radio (WMLS)

Site Information

GRAND MARAIS, MN

Venue Name WMLS
Latitude (NAD 83) 47° 46' 4.0" N
Longitude (NAD 83) 90° 20' 47.0" W
Climate Zone A
Rain Zone 2
Ground Elevation (AMSL) 452.89 m / 1485.9 ft

Link Information

Satellite Type Geostationary
Mode RO - Receive-Only
Modulation Digital
Satellite Arc 60° W to 143° West Longitude
Azimuth Range 141.7° to 240.5°
Corresponding Elevation Angles 27.8° / 15.7°
Antenna Centerline (AGL) 2.47 m / 8.1 ft

Antenna Information

Receive

Manufacturer Prodelin
Model 1374
Gain / Diameter 42.0 dBi / 3.7 m
3-dB / 15-dB Beamwidth 1.00° / 2.00°

Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Frequency Information

Receive 4.0 GHz

Emission / Frequency Range (MHz) 30K0G7W - 36M0G7W / 3700.0 - 4200.0

Max Great Circle Coordination Distance 373.0 km / 231.7 mi
Precipitation Scatter Contour Radius 516.3 km / 320.8 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 <http://www.comsearch.com>

Coordination Values

GRAND MARAIS, MN

Licensee Name Minnesota Public Radio (WMLS)
Latitude (NAD 83) 47° 46' 4.0" N
Longitude (NAD 83) 90° 20' 47.0" W
Ground Elevation (AMSL) 452.89 m / 1485.9 ft
Antenna Centerline (AGL) 2.47 m / 8.1 ft
Antenna Mode Receive 4.0 GHz
Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
0	1.73	118.52	-10.00	201.78
5	1.69	123.31	-10.00	202.92
10	1.02	126.42	-10.00	219.83
15	0.93	122.20	-10.00	223.95
20	1.08	117.98	-10.00	217.86
25	0.86	113.59	-10.00	227.99
30	0.63	109.18	-10.00	241.74
35	0.62	104.79	-10.00	242.10
40	0.49	100.36	-10.00	250.63
45	0.35	95.92	-10.00	266.43
50	0.43	91.48	-10.00	257.34
55	0.35	87.04	-10.00	266.84
60	0.00	82.63	-10.00	285.28
65	0.00	78.23	-10.00	285.28
70	0.00	73.84	-10.00	285.28
75	0.00	69.49	-10.00	285.28
80	0.00	65.17	-10.00	285.28
85	0.00	60.91	-10.00	285.28
90	0.00	56.72	-10.00	285.28
95	0.00	52.61	-10.00	285.28
100	0.00	48.62	-10.00	285.28
105	0.00	44.79	-9.28	289.91
110	0.00	41.14	-8.36	295.95
115	0.00	37.75	-7.42	302.21
120	0.00	34.68	-6.50	308.51
125	0.00	32.04	-5.64	315.14
130	0.00	29.94	-4.90	320.36
135	0.00	28.49	-4.37	324.20
140	0.00	27.81	-4.10	326.09
145	0.00	27.95	-4.16	325.70
150	0.00	28.89	-4.52	323.11
155	0.00	30.54	-5.12	318.83
160	0.00	32.14	-5.67	314.91
165	0.00	33.42	-6.10	311.29
170	0.00	34.36	-6.40	309.20
175	0.00	34.94	-6.58	307.95
180	0.00	35.13	-6.64	307.54
185	0.00	34.94	-6.58	307.95

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 <http://www.comsearch.com>

Coordination Values

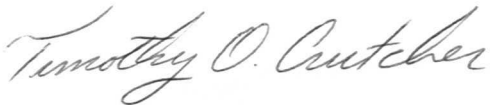
GRAND MARAIS, MN

Licensee Name Minnesota Public Radio (WMLS)
Latitude (NAD 83) 47° 46' 4.0" N
Longitude (NAD 83) 90° 20' 47.0" W
Ground Elevation (AMSL) 452.89 m / 1485.9 ft
Antenna Centerline (AGL) 2.47 m / 8.1 ft
Antenna Mode Receive 4.0 GHz
Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	34.36	-6.40	309.20
195	0.00	33.42	-6.10	311.30
200	0.00	32.14	-5.67	314.91
205	0.00	30.53	-5.12	318.83
210	0.00	28.64	-4.43	323.78
215	0.00	26.50	-3.58	329.89
220	0.00	24.12	-2.56	337.35
225	0.00	21.55	-1.34	346.45
230	0.00	18.82	0.13	357.62
235	0.00	16.61	1.49	368.13
240	0.00	15.70	2.10	372.95
245	0.00	16.30	1.70	369.75
250	0.00	18.27	0.46	360.14
255	0.00	21.22	-1.17	347.73
260	0.77	24.35	-2.66	278.65
265	1.15	28.23	-4.27	247.47
270	1.63	32.38	-5.76	222.77
275	1.75	36.86	-7.16	212.11
280	1.64	41.51	-8.45	208.96
285	1.73	46.17	-9.61	203.72
290	1.98	50.85	-10.00	194.97
295	2.24	55.58	-10.00	188.99
300	2.38	60.37	-10.00	185.88
305	2.28	65.21	-10.00	188.20
310	1.84	70.09	-10.00	198.78
315	2.15	74.91	-10.00	191.11
320	2.44	79.75	-10.00	184.34
325	2.49	84.62	-10.00	183.32
330	2.24	89.48	-10.00	189.08
335	1.90	94.34	-10.00	197.17
340	1.27	99.17	-10.00	212.12
345	1.02	103.99	-10.00	219.76
350	1.28	108.83	-10.00	211.84
355	1.59	113.69	-10.00	205.59

5. CERTIFICATION

I HEREBY CERTIFY THAT I AM THE TECHNICALLY QUALIFIED PERSON RESPONSIBLE FOR THE PREPARATION OF THE FREQUENCY COORDINATION DATA CONTAINED IN THIS APPLICATION, THAT I AM FAMILIAR WITH PARTS 101 AND 25 OF THE FCC RULES AND REGULATIONS, THAT I HAVE EITHER PREPARED OR REVIEWED THE FREQUENCY COORDINATION DATA SUBMITTED WITH THIS APPLICATION, AND THAT IT IS COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

A handwritten signature in cursive script that reads "Timothy O. Crutcher".

Timothy O. Crutcher
Frequency Planner
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147

DATED: April 22, 2018