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Callsign/Satellite ID:

APPLICATION FOR EARTH STATION AUTHORIZATIONS

**FCC 312 MAIN FORM
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APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:

Saint Paul - New Location - 3.8 Meter

1-8. Legal Name of Applicant

Name:	Minnesota Public Radio	Phone Number:	651-290-1500
DBA Name:		Fax Number:	651-290-1243
Street:	480 Cedar Street	E-Mail:	fccfiling@mpr.org
City:	Saint Paul	State:	MN
Country:	USA	Zipcode:	55101 -
Attention:	Mitzi T Gramling Esq		

9-16. Name of Contact Representative

Name:	Mitzi T Gramling Esq	Phone Number:	651-290-1500
Company:	Minnesota Public Radio	Fax Number:	651-290-1243
Street:	480 Cedar Street	E-Mail:	fccfiling@mpr.org
City:	Saint Paul	State:	MN
Country:	USA	Zipcode:	55101-
Attention:	Mitzi T Gramling Esq	Relationship:	Legal Counsel

CLASSIFICATION OF FILING

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.

a.

- a1. Earth Station
 (N/A) a2. Space Station

b.

- b1. Application for License of New Station
 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
 b10. Other (Please specify)
 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.

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 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:

(b) File number of pending application:

Not Applicable

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)

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: Frequency Upper:

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 RadHaz

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?	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> 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?	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> 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? If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.	<input type="radio"/> Yes <input checked="" type="radio"/> No
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.	<input type="radio"/> Yes <input checked="" type="radio"/> 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.	<input type="radio"/> Yes <input checked="" type="radio"/> 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	<input type="radio"/> Yes <input checked="" type="radio"/> 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.	<input type="radio"/> Yes <input checked="" type="radio"/> 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.	<input checked="" type="radio"/> Yes <input type="radio"/> 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.	<input type="radio"/> Yes <input checked="" type="radio"/> 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). 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. <input checked="" type="radio"/> 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
David Kansas

46. Title of Person Signing
Chief Operating Officer

47. Please supply any need attachments.

Attachment 1:

Attachment 2:

Attachment 3:

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:	3.8M	E5. Call Sign:	
E2: Contact Name	International Control Center	E6. Phone Number:	651-290-1563
E3. Street:	480 Cedar Street	E7. City:	Saint Paul
E4. State	MN	E8. County:	Ramsey
E10. Area of Operation:		E9. Zip Code	55101
E11. Latitude:	44 ° 56 ' 56.9 " N	CONUS, AK, HI, all US Territories	
E12. Longitude:	93 ° 5 ' 49.8 " W		

E13. Lat/Lon Coordinates are:

NAD-27

NAD-83

N/A

E14. Site Elevation (AMSL): 240.79 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 as AntState a technical analysis showing compliance with two-degree spacing policy. Yes No 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? Yes No N/A

E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point. Yes No

E18. Is frequency coordination required? If YES, attach a frequency coordination report as Yes No

E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as Yes 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. Yes No

POINTS OF COMMUNICATION

Satellite Name: ALSAT | ALL AUTHORIZED U.S. | ALSAT 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 Transmint and/or Recieve(____ dBi at ____ GHz)
3.8M	3.8M	1	Prodelin	1383	3.8	41.0 dBi at 3.950
						45.9 dBi at 6.175

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)
3.8M	0.0/0.0	261.83	21.04	16.24	40.0	4.8	61.92

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 ERIP Density per Carrier(dBW/4kHz)
3.8M	3700 4200	R	Horizontal and Vertical	150KF3D	0.0	0.0

E50. Modulation and Services Analog SCPC
3.8M 5925 6261 T Horizontal and Vertical 150KF3D 55.94 40.2

E50. Modulation and Services Analog SCPC
3.8M 6311 6425 T Horizontal and Vertical 150KF3D 55.94 40.2

E50. Modulation and Services Analog SCPC

3.8M	3700 4200	R	Horizontal and Vertical	1M85G7W	0.0	0.0
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E50. Modulation and Services Digital traffic, various information

3.8M	3700 4200	R	Horizontal and Vertical	76K8G7W	0.0	0.0
------	-----------	---	-------------------------	---------	-----	-----

E50. Modulation and Services Digital traffic, various information

3.8M	3700 4200	R	Horizontal and Vertical	76K8G1D	0.0	0.0
------	-----------	---	-------------------------	---------	-----	-----

E50. Modulation and Services Single channel carrier - digital modulation

3.8M	5925 6261	T	Horizontal and Vertical	1M85G7W	60.06	33.4
------	-----------	---	-------------------------	---------	-------	------

E50. Modulation and Services Digital traffic, various information

3.8M	5925 6261	T	Horizontal and Vertical	76K8G7W	55.83	43.0
------	-----------	---	-------------------------	---------	-------	------

E50. Modulation and Services Digital traffic, various information

3.8M	6311 6425	T	Horizontal and Vertical	1M85G7W	60.06	33.4
------	-----------	---	-------------------------	---------	-------	------

E50. Modulation and Services Digital traffic, various information

3.8M	6311 6425	T	Horizontal and Vertical	76K8G7W	55.83	43.0
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E50. Modulation and Services Digital traffic, various information

3.8M	5925 6261	T	Horizontal and Vertical	76K8G1D	55.83	43.0
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E50. Modulation and Services Single channel carrier - digital modulation

3.8M	6311 6425	T	Horizontal and Vertical	76K8G1D	55.83	43.0
------	-----------	---	-------------------------	---------	-------	------

E50. Modulation and Services Single channel carrier - digital modulation

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)
3.8M	Geostationary	3700 4200	93.0/139.0	179.9	38.2	235.6	21.4	0.0
	Geostationary	5925 6261	93.0/139.0	179.9	38.2	235.6	21.4	-4.0
	Geostationary	6311 6425	93.0/139.0	179.9	38.2	235.6	21.4	-4.0

REMOTE CONTROL POINT LOCATION

REMOTE CONTROL POINT LOCATION

E61. Call Sign				E65. Phone Number			
NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.							
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-PERM, 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
ST PAUL, MN
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
June 26, 2014

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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. Operation will be limited to the bandwidth shown in Section 4 of this report.

2. SUMMARY OF RESULTS

A number of great circle interference cases were identified during the interference study of the proposed earth station. Each of the cases, which exceeded the interference objective on a line-of-sight basis, was profiled and the propagation losses estimated using NBS TN101 (Revised) techniques. The losses were found to be sufficient to reduce the signal levels to acceptable magnitudes in every case.

The following companies reported potential great circle interference conflicts that did not meet the objectives on a line-of-sight basis. When over-the-horizon losses are considered on the interfering paths, sufficient blockage exists to negate harmful interference from occurring with the proposed transmit-receive earth station.

Company

BNSF Railway Company
Minnesota, State of (DOT)
New Cingular Wireless PCS LLC- Wisconsin
New Cingular Wireless PCS LLC-Minnesota
Rice County
St. Olaf College
T-Mobile License LLC
Verizon Wireless (VAW) LLC (ND,MN,SD,NE)

No other carriers reported potential interference cases.

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 06/10/2014.

Company

AT&T COMMUNICATIONS OF THE MIDWEST INC
AT&T Mobility Wireless Ops Hldgs - MN
BNSF Railway Company
CTC Telcom, Inc.
Cooperative TV Assn of Southern Minn.
Dairyland Power Cooperative
Eden Prairie, City of (Fire Dept)
HENNEPIN COUNTY
Illinois Central Railroad
Le Sueur County of
MEEKER, COUNTY OF
Midwest Wireless Communications, LLC
Minnesota, State of (DOT)
New Cingular Wireless PCS LLC- Wisconsin
New Cingular Wireless PCS LLC-Minnesota
Northern Border Pipeline Company
Northern PCS Services, LLC
RCC Minnesota Inc. - MN NE ND SD
RIVERLAND COMMUNICATIONS, INC.
Redwood Tel Acquisition, Inc.
Rice County
St. Olaf College
Steele County Sheriff's Office
T-Mobile License LLC
USCOC OF WISCONSIN RSA #6, INC.
USCOC OF WISCONSIN RSA #7, INC.
Verizon Wireless (VAW) LLC (ND,MN,SD,NE)
Verizon Wireless (VAW) LLC - IA/IL/WI
Waseca, County of
Wisconsin Bell, Inc.
Wisconsin, State of
Xcel Energy Services, Inc.

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: 06/26/2014
Job Number: 140610COMSTC03

Administrative Information

Licensee Name: Minnesota Public Radio

Site Information

ST PAUL, MN
Latitude (NAD 83): 44° 56' 56.9" N
Longitude (NAD 83): 93° 5' 49 8" W
Climate Zone: A
Rain Zone: 2
Ground Elevation (AMSL): 240.79 m / 790.0 ft

Link Information

Satellite Type: Geostationary
Mode: TR - Transmit-Receive
Modulation: Digital
Satellite Arc: 93° W to 139° West Longitude
Azimuth Range: 179.9° to 235.6°
Corresponding Elevation Angles: 38.2° / 21.4°
Antenna Centerline (AGL): 20.12 m / 66.0 ft

Antenna Information

	Receive	Transmit
Manufacturer	Prodelin	Prodelin
Model	1383	1383
Gain / Diameter	41.0 dBi / 3.8 m	45.9 dBi / 3.8 m
3-dB / 15-dB Beamwidth	1.20° / 2.40°	1.00° / 2.00°

		<u>76K8G7W - 1M85G7W</u>	<u>76K8G1D</u>	<u>150KF3D</u>	
Max Available RF Power	(dBW/4 kHz)	-2.9	-12.5	-2.9	-5.7
	(dBW/MHz)	21.1	11.5	21.1	18.3
Maximum EIRP	(dBW/4 kHz)	43.0	33.4	43.0	40.2
	(dBW/MHz)	67.0	57.4	67.0	64.2
	(dBW)	55.83	60.06	55.83	55.94
Interference Objectives:	Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
	Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%

Frequency Information

	Receive 4.0 GHz	Transmit 6.1 GHz
Emission / Frequency Range (MHz)	76K8G7W - 1M85G7W / 3700.0 - 4200.0 76K8G1D / 3700.0 - 4200.0 150KF3D / 3700.0 - 4200.0	76K8G7W - 1M85G7W / 5925.0 - 6261.0 76K8G7W - 1M85G7W / 6311.0 - 6425.0 76K8G1D / 5925.0 - 6261.0 76K8G1D / 6311.0 - 6425.0 150KF3D / 5925.0 - 6261.0 150KF3D / 6311.0 - 6425.0

Max Great Circle Coordination Distance	341.1 km / 211.9 mi	199.6 km / 124.0 mi
Precipitation Scatter Contour Radius	501.1 km / 311.4 mi	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

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

Coordination Values
ST PAUL, MN

Licensee Name Minnesota Public Radio
 Latitude (NAD 83) 44° 56' 56.9" N
 Longitude (NAD 83) 93° 5' 49.8" W
 Ground Elevation (AMSL) 240.79 m / 790.0 ft
 Antenna Centerline (AGL) 20.12 m / 66.0 ft

Antenna Mode	Receive 4.0 GHz	Transmit 6.1 GHz	
Interference Objectives: Long Term	-156.0 dBW/MHz 20%	-154.0 dBW/4 kHz	20%
Short Term	-146.0 dBW/MHz 0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power		-2.9 (dBW/4 kHz)	

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.71	121.90	-10.00	236.74	-10.00	130.12
5	0.78	126.44	-10.00	232.43	-10.00	126.80
10	0.70	130.87	-10.00	237.31	-10.00	130.56
15	0.00	134.98	-10.00	285.28	-10.00	169.88
20	0.27	137.76	-10.00	276.04	-10.00	160.20
25	0.34	135.60	-10.00	268.47	-10.00	153.76
30	0.26	132.98	-10.00	277.73	-10.00	161.66
35	0.26	130.14	-10.00	277.68	-10.00	161.62
40	0.20	127.03	-10.00	284.93	-10.00	169.57
45	0.31	123.81	-10.00	272.22	-10.00	156.93
50	0.23	120.34	-10.00	281.45	-10.00	164.90
55	0.25	116.78	-10.00	279.00	-10.00	162.76
60	0.37	113.15	-10.00	264.60	-10.00	150.53
65	0.34	109.38	-10.00	268.56	-10.00	153.83
70	0.35	105.56	-10.00	266.89	-10.00	152.44
75	0.29	101.67	-10.00	274.03	-10.00	158.47
80	0.32	97.77	-10.00	269.84	-10.00	154.91
85	0.29	93.84	-10.00	273.55	-10.00	158.06
90	0.34	89.89	-10.00	267.78	-10.00	153.17
95	0.34	85.95	-10.00	268.56	-10.00	153.83
100	0.00	82.05	-10.00	285.28	-10.00	169.88
105	0.30	78.12	-10.00	273.10	-10.00	157.68
110	0.29	74.25	-10.00	274.42	-10.00	158.80
115	0.20	70.45	-10.00	285.08	-10.00	169.71
120	0.00	66.77	-10.00	285.28	-10.00	169.88
125	0.00	63.12	-10.00	285.28	-10.00	169.88
130	0.00	59.58	-10.00	285.28	-10.00	169.88
135	0.00	56.17	-10.00	285.28	-10.00	169.88
140	0.00	52.92	-10.00	285.28	-10.00	169.88
145	0.39	49.61	-10.00	261.81	-10.00	148.24
150	0.45	46.73	-9.74	256.62	-9.74	143.67
155	0.43	44.20	-9.14	263.13	-9.14	148.05
160	0.56	41.89	-8.55	254.65	-8.55	140.47
165	0.63	40.02	-8.06	252.95	-8.06	138.49
170	0.80	38.53	-7.64	244.80	-7.64	133.22
175	0.67	37.82	-7.44	253.76	-7.44	138.27
180	0.66	37.57	-7.37	255.21	-7.37	139.28
185	0.81	37.21	-7.27	245.94	-7.27	133.57

COMSEARCH

Earth Station Data Sheet

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

Coordination Values		ST PAUL, MN			
Licensee Name		Minnesota Public Radio			
Latitude (NAD 83)		44° 56' 56.9" N			
Longitude (NAD 83)		93° 5' 49.8" W			
Ground Elevation (AMSL)		240.79 m / 790.0 ft			
Antenna Centerline (AGL)		20.12 m / 66.0 ft			
Antenna Mode		Receive 4.0 GHz		Transmit 6.1 GHz	
Interference Objectives: Long Term		-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
Short Term		-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power				-2.9 (dBW/4 kHz)	

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.80	36.60	-7.09	248.00	-7.09	133.60
195	0.71	35.67	-6.81	255.36	-6.81	138.61
200	0.43	34.54	-6.46	279.55	-6.46	157.44
205	0.00	33.19	-6.03	311.82	-6.03	185.27
210	0.00	31.14	-5.33	317.32	-5.33	187.95
215	0.00	28.82	-4.49	323.32	-4.49	191.18
220	0.00	26.26	-3.48	330.60	-3.48	195.05
225	0.00	23.78	-2.41	338.49	-2.41	199.16
230	0.23	21.88	-1.50	341.08	-1.50	199.57
235	0.32	21.10	-1.11	332.84	-1.11	192.82
240	0.57	21.28	-1.20	302.87	-1.20	170.03
245	0.90	22.47	-1.79	275.64	-1.79	147.41
250	0.97	24.82	-2.87	263.70	-2.87	139.79
255	0.94	27.91	-4.15	257.62	-4.15	136.84
260	0.93	31.45	-5.44	250.23	-5.44	134.23
265	0.87	35.33	-6.70	245.76	-6.70	132.71
270	0.75	39.46	-7.90	245.99	-7.90	133.17
275	0.60	43.75	-9.02	249.18	-9.02	137.01
280	0.40	48.16	-10.00	261.01	-10.00	147.58
285	0.38	52.59	-10.00	263.71	-10.00	149.79
290	0.30	57.10	-10.00	272.73	-10.00	157.36
295	0.31	61.64	-10.00	271.49	-10.00	156.31
300	0.26	66.23	-10.00	277.78	-10.00	161.70
305	0.29	70.84	-10.00	274.01	-10.00	158.45
310	0.28	75.47	-10.00	274.90	-10.00	159.21
315	0.26	80.12	-10.00	277.14	-10.00	161.15
320	0.23	84.78	-10.00	282.07	-10.00	165.44
325	0.45	89.44	-10.00	255.12	-10.00	142.83
330	0.50	94.11	-10.00	249.85	-10.00	138.80
335	0.69	98.78	-10.00	238.08	-10.00	131.14
340	0.98	103.47	-10.00	221.57	-10.00	118.09
345	1.22	108.16	-10.00	213.71	-10.00	111.41
350	0.73	112.73	-10.00	235.58	-10.00	129.24
355	0.36	117.26	-10.00	266.05	-10.00	151.73

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.

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

DATED: June 26, 2014



COMSEARCH

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Concerning the small diameter antenna exhibit for non routine antennas, pursuant to the *Part 25 Earth Station Fifth Report and Order*, the International Bureau (Bureau) provides the List of Approved Non-Routine Earth Station Antennas.

Earth station applicants proposing to use an antenna on this list will no longer need to attach antenna radiation plots as an exhibit to their applications, as required by Section 25.132 (b)(3) of the Commission's rules, 47 C.F.R. § 25.132 (b)(3). Rather, they need only to provide an attachment to their applications citing the particular non-routine earth station antenna they plan to use, and an application file number and call sign of a license in which that type of non-routine antenna has been approved, and an application file number and call sign of a license in which that type of non-routine antenna has been approved. Barring any countervailing considerations, the Bureau will consider grant of the application for the non-routine antenna, providing that the applicant proposes the same kinds of services as the operator of the previously authorized antenna, under the same or substantially similar operating conditions, and in some cases, plans to communicate with the same satellites.

The 3.8 meter antenna proposed in this application will operate within the parameters for the earth stations licensed under the following File Numbers and Call Signs. Based on this information the criteria in the above reference paragraph are satisfied.

File Number SES-LIC-20020114-00077 – Call Sign E050016

File Number SES-LIC-20060823-01496 – Call Sign E060333

FAA Notification Not Required

Per PART 17[17.14(b)] of the FCC rules, FAA notification is not required for this earth station. This 3.8 meter earth station antenna will be located on existing building. There are additional stories on the existing building taller than the antenna.

Analysis of Non-Ionizing Radiation for a 3.8-Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 3.8-meter earth station system. The analysis and calculations performed in this report comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant 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 flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, 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)
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm ²)
30-300	1.0
300-1500	Frequency (MHz)*(4.0/1200)
1500-100,000	5.0

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	3.8	m
Antenna Surface Area	A _{surface}	$\pi D^2 / 4$	11.34	m ²
Feed Flange Diameter	D _{fn}	Input	19.1	cm
Area of Feed Flange	A _{fn}	$\pi D_{fn}^2 / 4$	286.52	cm ²
Frequency	F	Input	6175	MHz
Wavelength	λ	300 / F	0.048583	m
Transmit Power	P	Input	40.00	W
Antenna Gain (dBi)	G ₀₀	Input	45.9	dBi
Antenna Gain (factor)	G	$10^{G_{00}/10}$	38904.5	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G\lambda^2/(\pi^2 D^2)$	0.64	n/a

1. Far Field Distance Calculation

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

$$\begin{aligned} \text{Distance to the Far Field Region} \quad R_{ff} &= 0.60 D^2 / \lambda \\ &= 178.3 \text{ m} \end{aligned} \quad (1)$$

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

$$\begin{aligned} \text{On-Axis Power Density in the Far Field} \quad S_{ff} &= G P / (4 \pi R_{ff}^2) \\ &= 3.894 \text{ W/m}^2 \\ &= 0.389 \text{ mW/cm}^2 \end{aligned} \quad (2)$$

2. Near Field Calculation

Power flux 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 diameter 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:

$$\begin{aligned} \text{Extent of the Near Field} \quad R_{nf} &= D^2 / (4 \lambda) \\ &= 74.3 \text{ m} \end{aligned} \quad (3)$$

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

$$\begin{aligned} \text{Near Field Power Density} \quad S_{nf} &= 16.0 \eta P / (\pi D^2) \\ &= 9.090 \text{ W/m}^2 \\ &= 0.909 \text{ mW/cm}^2 \end{aligned} \quad (4)$$

3. 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 1 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_t can be determined from the following equation:

$$\begin{aligned} \text{Transition Region Power Density} \quad S_t &= S_{nf} R_{nf} / R_t \\ &= 0.909 \text{ mW/cm}^2 \end{aligned} \quad (5)$$

Region between the Feed Assembly and the Antenna Reflector

Transmissions from the feed assembly are directed toward the antenna reflector surface, and are confined within a conical shape defined by the type of feed assembly. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the feed assembly and reflector surface can be calculated by determining the power density at the feed assembly surface. This can be determined from the following equation:

$$\begin{aligned} \text{Power Density at the Feed Flange} \quad S_{fa} &= 4000 P / A_{fa} & (6) \\ &= 558.423 \text{ mW/cm}^2 \end{aligned}$$

4. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the feed assembly. The area is now the area of the reflector aperture and can be determined from the following equation:

$$\begin{aligned} \text{Power Density at the Reflector Surface} \quad S_{\text{surface}} &= 4 P / A_{\text{surface}} & (7) \\ &= 14.108 \text{ W/m}^2 \\ &= 1.411 \text{ mW/cm}^2 \end{aligned}$$

5. Region between the Reflector and the Ground

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

$$\begin{aligned} \text{Power Density between Reflector and Ground} \quad S_g &= P / A_{\text{surface}} & (8) \\ &= 3.527 \text{ W/m}^2 \\ &= 0.353 \text{ mW/cm}^2 \end{aligned}$$

Radiation Hazard Report

6. Summary of Calculations

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm ²)		Hazard Assessment
1. Far Field ($R_{ff} = 178.3$ m)	S_{ff}	0.389	Satisfies FCC MPE
2. Near Field ($R_{nf} = 74.3$ m)	S_{nf}	0.909	Satisfies FCC MPE
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	0.909	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	S_{fa}	558.423	Potential Hazard
5. Main Reflector	$S_{surface}$	1.411	Potential Hazard
6. Between Reflector and Ground	S_g	0.353	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm ²)		Hazard Assessment
1. Far Field ($R_{ff} = 178.3$ m)	S_{ff}	0.389	Satisfies FCC MPE
2. Near Field ($R_{nf} = 74.3$ m)	S_{nf}	0.909	Satisfies FCC MPE
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	0.909	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	S_{fa}	558.423	Potential Hazard
5. Main Reflector	$S_{surface}$	1.411	Satisfies FCC MPE
6. Between Reflector and Ground	S_g	0.353	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.

7. Conclusions

Based on the above analysis it is concluded that the FCC MPE guidelines have been exceeded (or met) in the regions of Table 4 and 5. The applicant proposes to comply with the MPE limits by one or more of the following methods.

Means of Compliance Uncontrolled Areas

This antenna will be located on a building rooftop. The rooftop will not be accessible by the general public.

Since one diameter removed from the main beam of the antenna or ½ diameter removed from the edge of the antenna the RF levels are reduced by a factor of 100 or 20 dB. None of the areas exceeding the MPE levels will be accessible by the general public.

Radiation hazard signs will be posted while this earth station is in operation.

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