

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Space Exploration Holdings
MERRILLAN, WI
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
March 22, 2019

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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

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

<Companies Responding with Cases>

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 02/21/2019.

Company

AT&T Mobility Spectrum LLC -IL/WI Mkts
AT&T Mobility Spectrum-MN/IA/ND/NE/MT/SD
AT&T Wireless Services 3 LLC - IL, WI
AT&T Wireless Services 3 LLC - MN
Alltel Communications LLC - IL/IN/WI
Appleton Oshkosh Neenah MSA Ltd Partner
Aureon Communications, L.L.C.
Baycom Inc.
Bertram Communications
Black Hawk County E911 Service Board
Board of Trustees of Northern Michigan U
Brown County Public Safety Communication
Buchanan County of
Bug Tussel Wireless LLC
Business Only Broadband, LLC
Butler County IA
CTC Telcom, Inc.
Cedar Rapids Cellular Telephone Co., LP
Chequamegon Communications Cooperative
Chisago County Sheriff's Office
Citizens State Bank
City of Madison, WI
Clearwire Spectrum Holdings II, LLC
Clearwire Spectrum Holdings III, LLC
Columbia, County of
ComElec Services
Community Digital Wireless, LLC
Compudyne Inc.
Computer Dynamics of NW Illinois, LLC
Country Wireless, LLC
County of Burnett
County of Ramsey
Cover 2, LLC
Dane County
Danish, LLC
DiMan Systems
Douglas, County of
Dubuque, County of
Eau Claire, County of
Essex Telcom, Inc.
Ethoplex, LLC

Excel.Net Inc.
Fillmore, County of
First National Bank and Trust
First Security Bank & Trust Company
Fitchburg, City of
Genesis Technology Communications, LLC
Goodhue, County of
Houston, County of
Hoyos Consulting LLC
Interstate Power and Light Company
Iowa RSA #12 Limited Partnership
Iowa Wireless Services LLC
Jacked Wireless LLC
Jefferson, County of
Jo Carroll Energy, Inc
LCC Design Services
LTD Broadband LLC
La Crosse, City Of
Linn County Radio Governance Board
Linn, County of
LiteWire Internet Services, Inc.
Madison Cellular Telephone Company
Madison SMSA Limited Partnership
Manitowoc County of
Manitowoc County of DPW
Marathon, County of
Mayo Foundation for Medical Education
Mercury Network Corporation
Miller Electric Mfg. Corporation
Milwaukee County of
Milwaukee SMSA Limited Partnership
Minnesota Wifi
Minnesota, State of (DOT)
NEIT Wireless, LLC
NEXSTAR BROADCASTING, INC.
Neit Services, LLC
Netwurx LLC
New Cingular Wireless PCS LLC- Wisconsin
New Cingular Wireless PCS LLC-Minnesota
New Cingular Wireless PCS, LLC - IL
New Cingular Wireless PCS-ND,SD,NE,IA,MT
Nextera Wireless, LLC
Norlight Telecommunications, Inc
Northern Telephone and Data
NorthfieldWiFi
Northwoods Communication Technologies
Nsight Spectrum, LLC
Outagamie County Sheriff's Department
Pick Two LLC
Pierce, County of
Pine County Sheriffs Department
Radio Link Internet
ResTech Services
Riverland Communications, Inc.
Rock County of
ST Croix, County of

School District of Beloit Turner
 Skybeam Acquisition Corporation
 SmartSky Microwave, LLC
 Sonic Spectrum, Inc
 SonicNet Inc.
 SpeedConnect, LLC
 SpiraLight Networks, LLC
 Sprint Spectrum L.P.
 Sprintcom, Inc
 Starwire Technologies
 State of Wisconsin - Edu Comm Board
 SupraNet Communications
 T-Mobile License LLC
 Telecom Transport Management, Inc
 Trempealeau, County of
 US Cellular Operating Company, LLC (WI)
 USCOC OF WISCONSIN RSA #6, INC.
 USCOC of Central Illinois, LLC
 USCOC of Greater Iowa, LLC
 USCOC of Greater Wisconsin, L.P.
 USCOC of Illinois RSA 1, Inc.
 USCOC of Lacrosse, LLC
 USCOC of Wisconsin Rsa #7, Inc.
 Upnetwi Llc
 Upper Midwest Wireless, LLC
 Verizon Wireless (VAW) LLC (ND,MN,SD,NE)
 Verizon Wireless (VAW) LLC - IA/IL/WI
 Verizon Wireless (VAW) LLC- IN & KY Mkt
 Verizon Wireless VAW LLC-IA WI Grt Plns
 WASHINGTON, COUNTY OF
 WMSN Licensee, LLC
 WW Systems, LLC
 Washington County Sheriff's Department
 Waukesha, County of
 Waupaca County Communications
 Waushara County of
 West Wisconsin Telcom Cooperative, Inc.
 Whitewater Unified School District
 Whitewater Wideband LLC
 WiConnect Wireless LLC
 Winnebago, County of
 Winona, County of
 Wisconsin Electric Power Company
 Wisconsin Power & Light Company
 Wisconsin Public Service Corp.
 Wisconsin, State of
 Wisconsin, State of
 Wood, County 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: 03/22/2019
Job Number: 190221COMSGE06

Administrative Information

Status: ENGINEER PROPOSAL
Call Sign:
Licensee Code: SPACEX
Licensee Name: Space Exploration Holdings

Site Information

MERRILLAN, WI

Venue Name:
Latitude (NAD 83): 44° 24' 22.8" N
Longitude (NAD 83): 90° 48' 51.4" W
Climate Zone: A
Rain Zone: 2
Ground Elevation (AMSL): 274.17 m / 899.5 ft

Link Information

Satellite Type: Low Earth Orbit
Mode: TR - Transmit-Receive
Modulation: Digital
Minimum Elevation Angle: 25.0°
Azimuth Range: 0.0° to 360°
Antenna Centerline (AGL): 0.91 m / 3.0 ft

Antenna Information

Receive - FCC32

Transmit - FCC32

Manufacturer	Cobham	Cobham	
Model	MK3 series	MK3 series	
Gain / Diameter	39.3 dBi / 1.0 m	40.1 dBi / 1.0 m	
3-dB / 15-dB Beamwidth	1.50° / 3.40°	1.20° / 2.80°	
Max Available RF Power (dBW/4 kHz)	-1.2	-1.2	
(dBW/MHz)	22.8	22.8	
Maximum EIRP (dBW/4 kHz)	38.9	38.9	
(dBW/MHz)	62.9	62.9	
Interference Objectives:	Long Term	-156.0 dBW/MHz 20%	-151.0 dBW/4 kHz 20%
	Short Term	-146.0 dBW/MHz 0.01%	-128.0 dBW/4 kHz 0.0025%

Frequency Information

Receive 11.0 GHz

Transmit 14.0 GHz

Emission / Frequency Range (MHz)	240MD7W / 10700.0 - 12700.0	62M5D7W - 240MD7W / 14000.0 - 14500.0
Max Great Circle Coordination Distance	265.5 km / 165.0 mi	202.3 km / 125.7 mi
Precipitation Scatter Contour Radius	487.7 km / 303.0 mi	137.9 km / 85.7 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
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Coordination Values

MERRILLAN, WI

Licensee Name	Space Exploration Holdings				
Latitude (NAD 83)	44° 24' 22.8" N				
Longitude (NAD 83)	90° 48' 51.4" W				
Ground Elevation (AMSL)	274.17 m / 899.5 ft				
Antenna Centerline (AGL)	0.91 m / 3.0 ft				
Antenna Model	Cobham 1 meter				
Antenna Mode	Receive 11.0 GHz		Transmit 14.0 GHz		
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz	20%	
Short Term	-146.0 dBW/MHz	0.01%	-128.0 dBW/4 kHz	0.0025%	
Max Available RF Power			-1.2 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 14.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	89.44	-5.50	265.50	-5.50	202.30
5	0.00	84.50	-5.50	265.50	-5.50	202.30
10	0.00	79.57	-5.50	265.50	-5.50	202.30
15	0.00	74.64	-5.50	265.50	-5.50	202.30
20	0.00	69.71	-5.50	265.50	-5.50	202.30
25	0.00	64.78	-5.50	265.50	-5.50	202.30
30	0.00	59.86	-5.50	265.50	-5.50	202.30
35	0.00	54.95	-5.50	265.50	-5.50	202.30
40	0.00	50.06	-5.50	265.50	-5.50	202.30
45	0.00	45.17	-5.50	265.50	-5.50	202.30
50	0.00	40.31	-5.50	265.50	-5.50	202.30
55	0.00	35.49	-5.50	265.50	-5.50	202.30
60	0.00	30.71	-5.50	265.50	-5.50	202.30
65	0.00	26.00	-5.50	265.50	-5.50	202.30
70	0.00	21.41	-5.50	265.50	-5.50	202.30
75	0.00	17.05	-5.50	265.50	-5.50	202.30
80	0.00	13.13	-5.50	265.50	-5.50	202.30
85	0.00	10.18	-5.50	265.50	-5.50	202.30
90	0.00	9.19	-5.50	265.50	-5.50	202.30
95	0.00	10.71	-5.50	265.50	-5.50	202.30
100	0.00	13.96	-5.50	265.50	-5.50	202.30
105	0.00	18.01	-5.50	265.50	-5.50	202.30
110	0.00	22.44	-5.50	265.50	-5.50	202.30
115	0.00	27.06	-5.50	265.50	-5.50	202.30
120	0.00	31.78	-5.50	265.50	-5.50	202.30
125	0.00	36.58	-5.50	265.50	-5.50	202.30
130	0.00	41.42	-5.50	265.50	-5.50	202.30
135	0.00	46.28	-5.50	265.50	-5.50	202.30
140	0.00	51.17	-5.50	265.50	-5.50	202.30
145	0.00	56.07	-5.50	265.50	-5.50	202.30
150	0.00	60.98	-5.50	265.50	-5.50	202.30
155	0.00	65.90	-5.50	265.50	-5.50	202.30
160	0.00	70.83	-5.50	265.50	-5.50	202.30
165	0.00	75.76	-5.50	265.50	-5.50	202.30
170	0.00	80.69	-5.50	265.50	-5.50	202.30
175	0.00	85.62	-5.50	265.50	-5.50	202.30
180	0.00	90.56	-5.50	265.50	-5.50	202.30
185	0.00	95.50	-5.50	265.50	-5.50	202.30

COMSEARCH

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Coordination Values

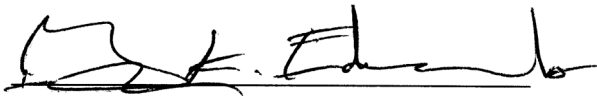
MERRILLAN, WI

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Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz	20%	
Short Term	-146.0 dBW/MHz	0.01%	-128.0 dBW/4 kHz	0.0025%	
Max Available RF Power			-1.2 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 14.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	100.43	-5.50	265.50	-5.50	202.30
195	0.00	105.36	-5.50	265.50	-5.50	202.30
200	0.00	110.29	-5.50	265.50	-5.50	202.30
205	0.00	115.22	-5.50	265.50	-5.50	202.30
210	0.00	120.14	-5.50	265.50	-5.50	202.30
215	0.00	125.05	-5.50	265.50	-5.50	202.30
220	0.00	129.94	-5.50	265.50	-5.50	202.30
225	0.00	134.83	-5.50	265.50	-5.50	202.30
230	0.00	139.69	-5.50	265.50	-5.50	202.30
235	0.00	144.51	-5.50	265.50	-5.50	202.30
240	0.00	149.29	-5.50	265.50	-5.50	202.30
245	0.00	154.00	-5.50	265.50	-5.50	202.30
250	0.00	158.59	-5.50	265.50	-5.50	202.30
255	0.00	162.95	-5.50	265.50	-5.50	202.30
260	0.00	166.87	-5.50	265.50	-5.50	202.30
265	0.00	169.82	-5.50	265.50	-5.50	202.30
270	0.00	170.81	-5.50	265.50	-5.50	202.30
275	0.00	169.29	-5.50	265.50	-5.50	202.30
280	0.00	166.04	-5.50	265.50	-5.50	202.30
285	0.00	161.99	-5.50	265.50	-5.50	202.30
290	0.00	157.56	-5.50	265.50	-5.50	202.30
295	0.00	152.94	-5.50	265.50	-5.50	202.30
300	0.00	148.22	-5.50	265.50	-5.50	202.30
305	0.00	143.42	-5.50	265.50	-5.50	202.30
310	0.00	138.59	-5.50	265.50	-5.50	202.30
315	0.00	133.72	-5.50	265.50	-5.50	202.30
320	0.00	128.83	-5.50	265.50	-5.50	202.30
325	0.00	123.93	-5.50	265.50	-5.50	202.30
330	0.00	119.02	-5.50	265.50	-5.50	202.30
335	0.00	114.10	-5.50	265.50	-5.50	202.30
340	0.00	109.17	-5.50	265.50	-5.50	202.30
345	0.00	104.24	-5.50	265.50	-5.50	202.30
350	0.00	99.31	-5.50	265.50	-5.50	202.30
355	0.00	94.38	-5.50	265.50	-5.50	202.30

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.

BY: 

Gary K. Edwards
Senior Manager
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147

DATED: March 22, 2019