

# 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

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### Administrative Information

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

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### 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

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### 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

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### 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
(dBW/MHz)		22.8
Maximum EIRP (dBW/4 kHz)		38.9
(dBW/MHz)		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%

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### 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

## Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147  
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### Coordination Values

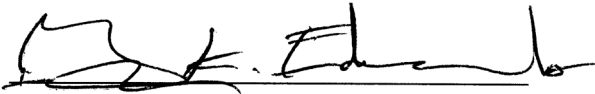
### MERRILLAN, WI

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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)
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