

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Space Exploration Holdings
NORTH BEND, WA
Satellite Earth Station

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

TABLE OF CONTENTS

1. CONCLUSIONS	3
2. SUMMARY OF RESULTS	4
3. SUPPLEMENTAL SHOWING	5
4. EARTH STATION COORDINATION DATA.....	9
5. CERTIFICATION.....	13

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

CenturyTel of Washington, Inc.
Seattle SMSA Limited Partnership

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 02/27/2019.

Company

AT&T Mobility Spectrum LLC - Washington
AT&T Mobility Wireless Ops Hldgs - WA
AT&T Mobility Wireless Ops Hldgs Inc -OR
AT&T Wireless Services 3 LLC - OR
Accel Net, Inc.
Advanced Internet
Air Speed Internet, LLC
All Classical Public Media, Inc
Astoria 911
Astound Broadband, LLC
Azure Standard
BNSF Railway Company
Bain, Robert B
Bearclaw, LLC
Bellingham, City of
Benton County Emergency Services
Benton Rural Electric Association
Boeing Company
Bookbinder, LLC
Boss Ventures, LLC
Business Only Broadband, LLC
Cascade Natural Gas Corporation
Cellco Partnership - Oregon
Cellco Partnership - Washington
Cencom - Kitsap 911
CenturyTel of Inter Island, Inc.
CenturyTel of Washington, Inc.
Chelan County PUD #1
City of Astoria
City of Portland
City of Seaside
City of Tacoma / Tacoma Public Utilities
Clackamas C800 Radio Group
Clackamas River Water District
Clackamas, County of
Clark, County of WA (Emergency Services)
Clearwire Spectrum Holdings II, LLC
Clearwire Spectrum Holdings III, LLC
Clearwire Spectrum Holdings LLC
Columbia 911 Communications District
Community Transit Snohomish County PTBA

Computer 5, Inc.
Cowlitz County Fire District #5
Cowlitz, County of
Cyberdyne Networks, Inc.
Darrington Internet Users Association
Day Management Corporation
Desert Winds Wireless
Eastern Oregon Telecom LLC
Eastside Public Safety Com Agency
Electron Hydro LLC
Ellensburg Telephone Company
Energy Northwest
Entercom License, LLC
Everett Clinic
Everett MSO, Inc.
Fisher Broadcasting, Inc. KOMO TV
Franklin County Sheriff
Freewire Broadband LLC
Frontier Communications Northwest Inc.
Frontier Telenet
Global Data Link, Inc
Gorge Networks
Haystack Broadcasting Inc
Hermiston, City of
Infinity Internet
Inland Cellular LLC
Jefferson Microwave, LLC
Johnson Network LLC
KGY, Inc.
King Broadcasting Company - KTVB TV
King County DOT Metro Transit Division
King, County of
M2 Mach Media, LLC
MCI Communications Services Inc.
Makah Tribe
Maritime Fire & Safety Association
Mason County PUD No 3
McDaniel Cellular Telephone Company
McMinnville Access Company
Medicine Wheel Website Design, Inc.
Microsoft
Mosier WiNet, LLC
Mt. Baker Cable
NCI Datacom, Inc.
NW Natural Gas Company
New Cingular Wireless PCS LLC -OR Region
New Cingular Wireless PCS LLC-Washington
Noel Communications, Inc.
North Central ESD
Northwest Open Access Network
Northwest Pipeline GP
Olympic Wireless, LLC
Orcas Power And Light Cooperative
Oregon RSA #2, Inc.
Oregon State
Oregon State (Osp)

PacifiCorp
Pacific Public Media
Pick Two LLC
Pierce County
Pierce Transit
PocketiNet Communications Inc.
Port of Seattle
Portland General Electric
Prinetime Internet Solutions, LLC
Public Util Dist. #1 of Snohomish County
Public Utility Dist #1 of Clark County
Public Utility Dist 1 of Cowlitz County
Public Utility District No 1 of Okanogan
Puget Sound Energy, Inc
Quicktel Internet
Qwest Corporation
Rivercom 911
Rock Island Technology Solutions
Sawtooth Technologies, LLC
Seattle City Light
Seattle FCC License Sub, LLC
Seattle SMSA Limited Partnership
Seattle's Best Internet, LLC
Seattle, City of
Sinclair Radio of Seattle Licensee, LLC
Skagit 911
Skotdal Brothers LLC (c/o CSI)
Snohomish County Emergency Radio System
Sound Internet Services, Inc.
Spectrum Communications Inc
Spectrum Networks Inc. - T
Sprint Spectrum L.P.
Sprintcom, Inc
St. Anthony Hospital
Startouch, Inc.
Stephouse Holdings Company, LLC
Stephouse Networks
Sunheaven Farms, LLC
Symplified Technologies, LLC
T-Mobile License LLC
Thurston 9-1-1 Communications
Tillamook County Emergency Communication
Towerstream Corp.
Tri County Metro Transit Dist of Oregon
USCOC of Richland, Inc.
Union Pacific Railroad Company
United Telephone Co. of the Northwest
Verizon Wireless (VAW) LLC - (WA)
Verizon Wireless (VAW) LLC-Portland, OR
Warden Hutterian Brethren Inc
Washington Broadband, Inc.
Washington County Consolidated Comm Agnc
Washington State Dept of Natural Resourc
Washington State of Dept of Transportat
Washington, State of
Western Sub-RSA LTD Partnership

Whiz to Coho, Inc.
Wiline Spectrum Holdings LLC
Wiztronics, Inc.
Yakima City Washington
Yakima MSA Limited Partnership

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: 190227COMSGE01

Administrative Information

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

Site Information NORTH BEND, WA

Venue Name
Latitude (NAD 83) 47° 28' 56.8" N
Longitude (NAD 83) 121° 45' 40.7" W
Climate Zone A
Rain Zone 3
Ground Elevation (AMSL) 149.55 m / 490.6 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

Manufacturer Cobham
Model MK3 series
Gain / Diameter 39.3 dBi / 1.0 m
3-dB / 15-dB Beamwidth 1.50° / 3.40°

Transmit - FCC32

Cobham
MK3 series
40.1 dBi / 1.0 m
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
(dBW)

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

Emission / Frequency Range (MHz) Receive 11.0 GHz 240MD7W / 10700.0 - 12700.0

Transmit 14.0 GHz

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 356.3 km / 221.4 mi 127.5 km / 79.2 mi

COMSEARCH

Earth Station Data Sheet

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Coordination Values

NORTH BEND, WA

Licensee Name Space Exploration Holdings
Latitude (NAD 83) 47° 28' 56.8" N
Longitude (NAD 83) 121° 45' 40.7" W
Ground Elevation (AMSL) 149.55 m / 490.6 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	68.60	-5.50	265.50	-5.50	202.30
5	0.00	64.33	-5.50	265.50	-5.50	202.30
10	0.00	60.12	-5.50	265.50	-5.50	202.30
15	0.00	55.99	-5.50	265.50	-5.50	202.30
20	0.00	51.95	-5.50	265.50	-5.50	202.30
25	0.00	48.04	-5.50	265.50	-5.50	202.30
30	0.00	44.29	-5.50	265.50	-5.50	202.30
35	0.00	40.75	-5.50	265.50	-5.50	202.30
40	0.00	37.48	-5.50	265.50	-5.50	202.30
45	0.00	34.57	-5.50	265.50	-5.50	202.30
50	0.00	32.10	-5.50	265.50	-5.50	202.30
55	0.00	30.19	-5.50	265.50	-5.50	202.30
60	0.00	28.96	-5.50	265.50	-5.50	202.30
65	0.00	28.48	-5.50	265.50	-5.50	202.30
70	0.00	28.81	-5.50	265.50	-5.50	202.30
75	0.00	29.90	-5.50	265.50	-5.50	202.30
80	0.00	31.69	-5.50	265.50	-5.50	202.30
85	0.00	34.06	-5.50	265.50	-5.50	202.30
90	0.00	36.90	-5.50	265.50	-5.50	202.30
95	0.00	40.11	-5.50	265.50	-5.50	202.30
100	0.00	43.60	-5.50	265.50	-5.50	202.30
105	0.00	47.31	-5.50	265.50	-5.50	202.30
110	0.00	51.19	-5.50	265.50	-5.50	202.30
115	0.00	55.21	-5.50	265.50	-5.50	202.30
120	0.00	59.33	-5.50	265.50	-5.50	202.30
125	0.00	63.53	-5.50	265.50	-5.50	202.30
130	0.00	67.79	-5.50	265.50	-5.50	202.30
135	0.00	72.09	-5.50	265.50	-5.50	202.30
140	0.00	76.44	-5.50	265.50	-5.50	202.30
145	0.00	80.80	-5.50	265.50	-5.50	202.30
150	0.00	85.19	-5.50	265.50	-5.50	202.30
155	0.00	89.58	-5.50	265.50	-5.50	202.30
160	0.00	93.98	-5.50	265.50	-5.50	202.30
165	0.00	98.36	-5.50	265.50	-5.50	202.30
170	0.00	102.74	-5.50	265.50	-5.50	202.30
175	0.00	107.08	-5.50	265.50	-5.50	202.30
180	0.00	111.40	-5.50	265.50	-5.50	202.30
185	0.00	115.67	-5.50	265.50	-5.50	202.30

COMSEARCH

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Coordination Values

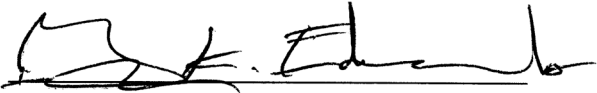
NORTH BEND, WA

Licensee Name	Space Exploration Holdings			
Latitude (NAD 83)	47° 28' 56.8" N			
Longitude (NAD 83)	121° 45' 40.7" W			
Ground Elevation (AMSL)	149.55 m / 490.6 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)
190	0.00	119.88	-5.50	265.50	-5.50	202.30
195	0.00	124.01	-5.50	265.50	-5.50	202.30
200	0.00	128.05	-5.50	265.50	-5.50	202.30
205	0.00	131.96	-5.50	265.50	-5.50	202.30
210	0.00	135.71	-5.50	265.50	-5.50	202.30
215	0.00	139.25	-5.50	265.50	-5.50	202.30
220	0.00	142.52	-5.50	265.50	-5.50	202.30
225	0.00	145.43	-5.50	265.50	-5.50	202.30
230	0.00	147.90	-5.50	265.50	-5.50	202.30
235	0.00	149.81	-5.50	265.50	-5.50	202.30
240	0.00	151.04	-5.50	265.50	-5.50	202.30
245	0.00	151.52	-5.50	265.50	-5.50	202.30
250	0.00	151.19	-5.50	265.50	-5.50	202.30
255	0.00	150.10	-5.50	265.50	-5.50	202.30
260	0.00	148.31	-5.50	265.50	-5.50	202.30
265	0.00	145.94	-5.50	265.50	-5.50	202.30
270	0.00	143.10	-5.50	265.50	-5.50	202.30
275	0.00	139.89	-5.50	265.50	-5.50	202.30
280	0.00	136.40	-5.50	265.50	-5.50	202.30
285	0.00	132.69	-5.50	265.50	-5.50	202.30
290	0.00	128.81	-5.50	265.50	-5.50	202.30
295	0.00	124.79	-5.50	265.50	-5.50	202.30
300	0.00	120.67	-5.50	265.50	-5.50	202.30
305	0.00	116.47	-5.50	265.50	-5.50	202.30
310	0.00	112.21	-5.50	265.50	-5.50	202.30
315	0.00	107.91	-5.50	265.50	-5.50	202.30
320	0.00	103.56	-5.50	265.50	-5.50	202.30
325	0.00	99.20	-5.50	265.50	-5.50	202.30
330	0.00	94.81	-5.50	265.50	-5.50	202.30
335	0.00	90.42	-5.50	265.50	-5.50	202.30
340	0.00	86.02	-5.50	265.50	-5.50	202.30
345	0.00	81.64	-5.50	265.50	-5.50	202.30
350	0.00	77.26	-5.50	265.50	-5.50	202.30
355	0.00	72.92	-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