

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Denali 20020, LLC
BREWSTER, WA
Satellite Earth Station

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

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 04/02/2019.

Company

AT&T Mobility Spectrum LLC - ID, MT, WY
AT&T Mobility Spectrum LLC - Washington
AT&T Mobility Wireless Ops Hldgs - WA
Accel Net, Inc.
Advanced Internet
Advantagecom Networks, Inc.
Avista Corporation
BNSF Railway Company
Bain, Robert B
Bearclaw, LLC
Benton County Emergency Services
Benton Rural Electric Association
Boeing Company
Bookbinder, LLC
Brigadier, LLC
Business Only Broadband, LLC
Cascade Natural Gas Corporation
Cellco Partnership - Oregon
Cellco Partnership - Washington
Cencom - Kitsap 911
CenturyTel of Washington, Inc.
Chelan County PUD #1
City of Post Falls Police Department
City of Tacoma / Tacoma Public Utilities
Clearwire Spectrum Holdings II, LLC
Clearwire Spectrum Holdings III, LLC
Clearwire Spectrum Holdings LLC
Columbia Rural Electric Association, Inc
Community Transit Snohomish County PTBA
Computer 5, Inc.
Cyberdyne Networks, Inc.
Darrington Internet Users Association
Day Management Corporation
Desert Winds Wireless
Eastside Public Safety Com Agency
EcliptixNet Broadband, Inc.
Electron Hydro LLC
Ellensburg Telephone Company
Energy Northwest
Everett Clinic
Everett MSO, Inc.

First Step Internet, LLC
Fisher Broadcasting, Inc. KOMO TV
Franklin County Sheriff
Frontier Communications Northwest Inc.
Hermiston, City of
Inland Cellular LLC
J & R Electronics Inc
J&R Electronics, Inc.
Jefferson Microwave, LLC
KGY, Inc.
King Broadcasting Company - KTVB TV
King County DOT Metro Transit Division
King, County of
Kootenai, County of
Leader Communications LLC
McDaniel Cellular Telephone Company
Medicine Wheel Website Design, Inc.
Microsoft
NCI Datacom, Inc.
New Cingular Wireless PCS - ID, WY
New Cingular Wireless PCS LLC-Washington
Newmax, LLC
Noel Communications, Inc.
Northwest Open Access Network
Northwest Pipeline GP
Olympic Wireless, LLC
PacifiCorp
Pacific Public Media
Pass Word, Inc.
Pick Two LLC
Pierce County
Pierce Transit
PocketiNet Communications Inc.
Port of Seattle
Ptera Wireless, Inc.
Public Util Dist. #1 of Snohomish County
Public Utility District No 1 of Okanogan
Puget Sound Energy, Inc
Quicktel Internet
Qwest Corporation
RSN Wireless, LLC
Rivercom 911
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
Skotdal Brothers LLC (c/o CSI)
Snohomish County Emergency Radio System
Spectrum Communications Inc
Spectrum Networks Inc. - T
Spokane Regional Emergency Communication
Spokane Tribe Telecommunications Exchang
Sprint Spectrum L.P.
Sprintcom, Inc

St. Anthony Hospital
Startouch, Inc.
Stevens County Sheriff's Office
Summit Towers LLC
Sunheaven Farms, LLC
Simplified Technologies, LLC
T-Mobile Lic LLC - Voicestream PCS BTA I
T-Mobile License LLC
THE Corporation
Thurston 9-1-1 Communications
Towerstream Corp.
USCOC of Richland, Inc.
Union Pacific Railroad Company
United Telephone Co. of the Northwest
VelociMAX Wireless
Verizon Wireless (VAW) LLC - (WA)
Verizon Wireless (VAW) LLC - Idaho
Verizon Wireless (VAW) LLC -CO/ID/MT/WY
Verizon Wireless (VAW) LLC-Portland, OR
Warden Hutterian Brethren Inc
Washington Broadband, Inc.
Washington State Dept of Natural Resourc
Washington State of Dept of Transportat
Washington, State of
Western Sub-RSA LTD Partnership
Whitman County Fire District #11
Wind Wireless, Inc.
Wired or Wireless, 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: 04/22/2019
Job Number: 190402COMSGE02

Administrative Information

Status ENGINEER PROPOSAL
Call Sign E891020
Licensee Code DENALI
Licensee Name Denali 20020, LLC

Site Information BREWSTER, WA

Venue Name
Latitude (NAD 83) 48° 8' 47.5" N
Longitude (NAD 83) 119° 41' 31.2" W
Climate Zone A
Rain Zone 5
Ground Elevation (AMSL) 377.04 m / 1237.0 ft

Link Information

Satellite Type Geostationary
Mode TR - Transmit-Receive
Modulation Digital
Satellite Arc 53° W to 186° West Longitude
Azimuth Range 107.8° to 251.9°
Corresponding Elevation Angles 6.7° / 6.9°
Antenna Centerline (AGL) 6.1 m / 20.0 ft

Antenna Information

Manufacturer Vertex
Model 9 meter
Gain / Diameter 59.2 dBi / 9.0 m
3-dB / 15-dB Beamwidth 0.20° / 0.38°

Receive - FCC32

Vertex
9 meter
59.2 dBi / 9.0 m
0.20° / 0.38°

Transmit - FCC32

Vertex
9 meter
60.4 dBi / 9.0 m
0.16° / 0.32°

Max Available RF Power	(dBW/4 kHz)	-14.0			
	(dBW/MHz)	10.0			
Maximum EIRP	(dBW/4 kHz)	46.4			
	(dBW/MHz)	70.4			
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

Emission / Frequency Range (MHz)
1M00G7D - 72M0G7W / 10950.0 - 11200.0
1M00G7D - 72M0G7W / 11450.0 - 12200.0

Receive 11.0 GHz

Transmit 14.0 GHz

1M00G7D - 72M0G7W / 14000.0 - 14500.0

Max Great Circle Coordination Distance 468.7 km / 291.2 mi 224.2 km / 139.3 mi
Precipitation Scatter Contour Radius 403.4 km / 250.6 mi 100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
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Coordination Values

BREWSTER, WA

Licensee Name Denali 20020, LLC
Latitude (NAD 83) 48° 8' 47.5" N
Longitude (NAD 83) 119° 41' 31.2" W
Ground Elevation (AMSL) 377.04 m / 1237.0 ft
Antenna Centerline (AGL) 6.1 m / 20.0 ft
Antenna Model Vertex 9 meter
Antenna Mode Receive 11.0 GHz Transmit 14.0 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 -14.0 (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	0.81	107.70	-10.00	191.65	-10.00	100.00
5	0.89	102.73	-10.00	187.66	-10.00	100.00
10	0.71	97.75	-10.00	196.39	-10.00	100.00
15	1.23	92.78	-10.00	174.05	-10.00	100.00
20	1.81	87.80	-10.00	152.29	-10.00	100.00
25	0.54	82.84	-10.00	204.81	-10.00	100.00
30	0.54	77.87	-10.00	204.87	-10.00	100.00
35	0.72	72.89	-10.00	195.96	-10.00	100.00
40	1.21	67.90	-10.00	174.78	-10.00	100.00
45	1.57	62.91	-10.00	159.93	-10.00	100.00
50	1.49	57.94	-10.00	162.40	-10.00	100.00
55	1.85	52.95	-10.00	150.85	-10.00	100.00
60	1.73	47.99	-10.00	154.54	-10.00	100.00
65	2.12	42.99	-8.83	148.95	-8.83	100.00
70	2.17	38.02	-7.50	154.34	-7.50	100.00
75	2.43	33.04	-5.97	155.44	-5.97	100.00
80	2.63	28.06	-4.20	159.75	-4.20	100.00
85	2.56	23.14	-2.11	175.83	-2.11	100.00
90	2.77	18.20	0.50	184.39	0.50	100.00
95	2.88	13.33	3.88	198.41	3.88	100.00
100	2.69	8.75	8.46	222.28	8.46	100.00
105	2.37	5.12	14.26	264.92	14.26	117.58
110	2.24	4.95	14.64	424.56	14.64	192.00
115	2.24	7.95	9.49	238.26	9.49	103.48
120	2.44	10.83	6.13	215.68	6.13	100.00
125	2.66	13.59	3.67	202.05	3.67	100.00
130	1.71	17.18	1.13	208.88	1.13	100.00
135	0.95	20.50	-0.79	222.31	-0.79	104.53
140	0.44	23.46	-2.26	244.43	-2.26	124.68
145	0.29	25.93	-3.34	254.00	-3.34	132.49
150	0.00	28.31	-4.30	258.30	-4.30	137.31
155	0.00	30.17	-4.99	254.84	-4.99	135.30
160	0.00	31.76	-5.55	252.11	-5.55	133.73
165	0.00	33.03	-5.97	250.04	-5.97	132.56
170	0.00	33.96	-6.27	248.59	-6.27	131.74
175	0.00	34.52	-6.45	247.73	-6.45	131.26
180	0.00	34.71	-6.51	247.45	-6.51	131.10
185	0.00	34.52	-6.45	247.73	-6.45	131.26

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Earth Station Data Sheet

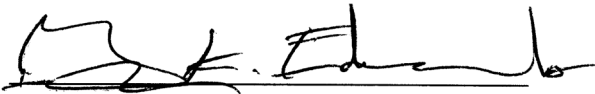
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Antenna Mode	Receive 11.0 GHz	Transmit 14.0 GHz		
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power			-14.0 (dBW/4 kHz)	

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	33.96	-6.27	248.59	-6.27	131.74
195	0.00	33.03	-5.97	250.04	-5.97	132.56
200	0.00	31.76	-5.55	252.11	-5.55	133.74
205	0.00	30.18	-4.99	254.84	-4.99	135.30
210	0.00	28.31	-4.30	258.30	-4.30	137.31
215	0.00	26.18	-3.45	262.59	-3.45	139.85
220	0.00	23.84	-2.43	267.86	-2.43	143.01
225	0.00	21.29	-1.20	274.35	-1.20	146.98
230	0.00	18.59	0.27	282.38	0.27	151.99
235	0.00	15.73	2.08	292.55	2.08	158.49
240	0.21	12.60	4.49	302.93	4.49	168.14
245	0.38	9.41	7.66	304.18	7.66	161.35
250	0.47	6.72	11.32	468.66	11.32	224.23
255	2.06	5.76	12.98	264.47	12.98	118.99
260	1.81	9.57	7.48	238.14	7.48	106.10
265	2.41	13.84	3.47	203.69	3.47	100.00
270	3.15	18.48	0.33	174.55	0.33	100.00
275	3.57	23.33	-2.20	148.33	-2.20	100.00
280	3.36	28.31	-4.30	142.51	-4.30	100.00
285	3.16	33.29	-6.06	138.63	-6.06	100.00
290	3.16	38.26	-7.57	132.18	-7.57	100.00
295	1.94	43.33	-8.92	153.38	-8.92	100.00
300	1.72	48.31	-10.00	155.06	-10.00	100.00
305	2.17	53.25	-10.00	142.68	-10.00	100.00
310	1.91	58.24	-10.00	149.14	-10.00	100.00
315	1.89	63.21	-10.00	149.73	-10.00	100.00
320	2.11	68.18	-10.00	143.88	-10.00	100.00
325	2.11	73.16	-10.00	144.04	-10.00	100.00
330	2.40	78.14	-10.00	137.58	-10.00	100.00
335	1.91	83.13	-10.00	149.16	-10.00	100.00
340	1.26	88.11	-10.00	172.95	-10.00	100.00
345	0.69	93.08	-10.00	197.41	-10.00	100.00
350	0.35	98.05	-10.00	216.98	-10.00	111.42
355	0.00	103.01	-10.00	231.37	-10.00	123.34

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: April 22, 2019