

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
EchoStar Corporation
BLACK HAWK, SD
(E020248)
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
February 09, 2017

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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 01/25/2017.

Company

Campbell, County of
Qwest Corporation
Range Telephone Cooperative, Inc.
Rapid City Medical Center, LLP
Visionary Communications, Inc.
West River Electric Association Inc
Western Communications, 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.

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Earth Station Data Sheet

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

Date: 01/25/2017
Job Number: 170125COMSGE05

Administrative Information

Status ENGINEER PROPOSAL
Call Sign E020248
Licensee Code ZECHOS
Licensee Name EchoStar Corporation

Site Information

BLACK HAWK, SD

Venue Name BLACK HAWK
Latitude (NAD 83) 44° 11' 15.3" N
Longitude (NAD 83) 103° 20' 9.7" W
Climate Zone A
Rain Zone 5
Ground Elevation (AMSL) 1109.46 m / 3640.0 ft

Link Information

Satellite Type Geostationary
Mode TR - Transmit-Receive
Modulation Digital
Satellite Arc 33° W to 174° West Longitude
Azimuth Range 104.0° to 256.3°
Corresponding Elevation Angles 5.3° / 5.1°
Antenna Centerline (AGL) 6.4 m / 21.0 ft

Antenna Information

Transmit - FCC32

Manufacturer	Vertex	Vertex
Model	8 Meter	8 Meter
Gain / Diameter	58.0 dBi / 8.0 m	60.0 dBi / 8.0 m
3-dB / 15-dB Beamwidth	0.10° / 0.20°	0.07° / 0.14°

Max Available RF Power	(dBW/4 kHz)	-5.8
	(dBW/MHz)	18.2

Maximum EIRP	(dBW/4 kHz)	54.2
	(dBW/MHz)	78.2

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

Transmit 18.0 GHz

Emission / Frequency Range (MHz)	300KGXD - 800KF3D / 12200.0 - 12700.0 24MOG1W / 12200.0 - 12700.0	800KF3D - 1M50F3D / 17300.0 - 17800.0 24MOG1W / 17300.0 - 17800.0	
Max Great Circle Coordination Distance	566.4 km / 351.9 mi	378.6 km / 235.2 mi	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	417.1 km / 259.1 mi		

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Earth Station Data Sheet

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Coordination Values

BLACK HAWK, SD

Licensee Name	EchoStar Corporation		
Latitude (NAD 83)	44° 11' 15.3" N		
Longitude (NAD 83)	103° 20' 9.7" W		
Ground Elevation (AMSL)	1109.46 m / 3640.0 ft		
Antenna Centerline (AGL)	6.4 m / 21.0 ft		
Antenna Model	Vertex 8 Meter		
Antenna Mode	Receive 12.2 GHz		Transmit 17.3 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		0.0 (dBW/4 kHz)	

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 12.2 GHz		Transmit 17.3 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	1.98	103.73	-10.00	143.77	-10.00	100.00
5	2.51	98.98	-10.00	132.41	-10.00	100.00
10	2.85	93.99	-10.00	127.32	-10.00	100.00
15	2.86	88.99	-10.00	127.26	-10.00	100.00
20	3.19	83.99	-10.00	121.35	-10.00	100.00
25	3.52	78.99	-10.00	115.68	-10.00	100.00
30	3.44	74.00	-10.00	116.98	-10.00	100.00
35	3.86	69.00	-10.00	110.04	-10.00	100.00
40	4.26	63.99	-10.00	104.46	-10.00	100.00
45	4.31	58.99	-10.00	103.75	-10.00	100.00
50	4.32	54.00	-10.00	103.69	-10.00	100.00
55	4.02	49.00	-10.00	107.51	-10.00	100.00
60	4.02	44.00	-9.09	110.59	-9.09	100.00
65	4.30	39.00	-7.78	111.60	-7.78	100.00
70	4.15	34.01	-6.29	118.97	-6.29	100.00
75	4.22	29.01	-4.56	124.67	-4.56	100.00
80	4.77	23.99	-2.50	125.55	-2.50	100.00
85	4.82	18.99	0.03	133.70	0.03	100.00
90	3.58	14.09	3.28	175.43	3.28	100.00
95	1.96	9.59	7.46	228.72	7.46	139.92
100	2.71	4.76	15.07	256.91	15.07	156.66
105	1.61	3.82	17.44	566.39	17.44	378.57
110	0.25	7.80	9.70	358.14	9.70	241.88
115	0.00	11.39	5.59	305.85	5.59	214.70
120	0.00	14.71	2.81	292.24	2.81	203.69
125	0.00	17.94	0.66	280.30	0.66	196.34
130	0.00	21.05	-1.08	270.97	-1.08	189.74
135	0.00	24.03	-2.52	263.48	-2.52	184.28
140	0.00	26.83	-3.72	257.37	-3.72	179.73
145	0.32	29.17	-4.62	240.00	-4.62	163.68
150	0.73	31.18	-5.35	208.16	-5.35	131.08
155	1.21	32.83	-5.91	189.39	-5.91	113.60
160	1.33	34.47	-6.44	183.39	-6.44	109.08
165	1.50	35.72	-6.82	176.40	-6.82	103.86
170	1.94	36.31	-7.00	158.94	-7.00	100.00
175	1.94	36.92	-7.18	158.01	-7.18	100.00
180	2.67	36.40	-7.03	141.23	-7.03	100.00
185	3.77	35.11	-6.63	123.62	-6.63	100.00

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Earth Station Data Sheet

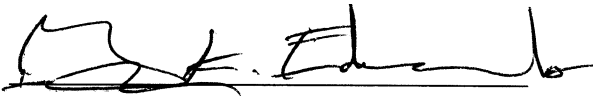
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	Short Term	-146.0 dBW/MHz 0.01%	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	0.0 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 12.2 GHz		Transmit 17.3 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	3.77	34.52	-6.45	124.32	-6.45	100.00
195	4.98	32.37	-5.75	110.38	-5.75	100.00
200	4.96	31.08	-5.31	112.24	-5.31	100.00
205	2.55	31.63	-5.50	151.15	-5.50	100.00
210	2.67	29.49	-4.74	151.95	-4.74	100.00
215	2.95	26.95	-3.76	150.24	-3.76	100.00
220	3.42	24.03	-2.52	146.05	-2.52	100.00
225	3.58	21.17	-1.14	149.41	-1.14	100.00
230	3.58	18.26	0.46	157.60	0.46	100.00
235	3.61	15.18	2.47	170.25	2.47	100.00
240	3.63	11.98	5.03	183.64	5.03	101.63
245	3.60	8.73	8.48	201.54	8.48	114.73
250	3.70	5.30	13.89	282.72	13.89	168.26
255	3.65	1.90	25.04	537.10	25.04	354.65
260	3.82	3.95	17.09	244.51	17.09	142.97
265	4.09	8.80	8.39	191.88	8.39	106.48
270	3.26	13.86	3.45	183.53	3.45	102.23
275	3.06	18.85	0.12	170.62	0.12	100.00
280	2.74	23.85	-2.44	162.18	-2.44	100.00
285	2.47	28.85	-4.50	157.96	-4.50	100.00
290	2.48	33.83	-6.23	149.11	-6.23	100.00
295	2.02	38.85	-7.73	153.08	-7.73	100.00
300	2.10	43.83	-9.04	145.05	-9.04	100.00
305	1.53	48.84	-10.00	157.06	-10.00	100.00
310	1.22	53.84	-10.00	169.93	-10.00	101.70
315	0.25	58.87	-10.00	222.69	-10.00	149.87
320	0.00	63.86	-10.00	227.19	-10.00	154.56
325	0.00	68.83	-10.00	227.19	-10.00	154.56
330	0.00	73.81	-10.00	227.19	-10.00	154.56
335	1.16	78.77	-10.00	172.01	-10.00	103.27
340	1.08	83.76	-10.00	174.71	-10.00	105.33
345	1.48	88.75	-10.00	158.81	-10.00	100.00
350	1.46	93.74	-10.00	159.30	-10.00	100.00
355	1.55	98.73	-10.00	156.55	-10.00	100.00

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
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DATED: February 09, 2017