

# FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for  
**EchoStar Corporation**  
**CHEYENNE, WY**  
**(3.7 Meter)**  
**Satellite Earth Station**

Prepared By:  
COMSEARCH  
19700 Janelia Farm Boulevard  
Ashburn, VA 20147  
January 05, 2015

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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 12/11/2014.

Company

ACS Communications  
Action Communications Inc.  
Anadarko Petroleum Corporation  
Board of Public Utilities  
Boulder, County of  
Cheyenne Light, Fuel & Power  
City of Boulder  
City of Cheyenne  
Clearwire Spectrum Holdings III, LLC  
Eagle-Net Alliance  
High West Energy  
Inventive Wireless of Nebraska, LLC  
LP Broadband, Inc.  
Laramie County  
Laurence Brett Glass  
MOBILE RELAY ASSOCIATES INC  
MPX  
Millhouse Electronics Inc  
NE Colorado Cellular, Inc.  
New Cingular Wireless PCS LLC -Colorado  
State of Colorado  
Thompson School District R2-J  
Union Telephone Company, Inc.  
Verizon Wireless (VAW) LLC -CO/ID/MT/WY  
Vyvx , LLC - Colorado  
WERCS Communications Inc.  
Weld County Colorado  
Weld County District RE3J

## **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: 12/11/2014  
Job Number: <PCNJobCode>

### Administrative Information

Status: ENGINEER PROPOSAL  
Call Sign: <PCNCallSign>  
Licensee Code: ZECHOS  
Licensee Name: EchoStar Corporation

### Site Information

**CHEYENNE, WY**  
Venue Name  
Latitude (NAD 83): 41° 7' 54.4" N  
Longitude (NAD 83): 104° 44' 13.0" W  
Climate Zone: A  
Rain Zone: 2  
Ground Elevation (AMSL): 1810.51 m / 5940.0 ft

### Link Information

Satellite Type: Geostationary  
Mode: TR - Transmit-Receive  
Modulation: Digital  
Satellite Arc: 42° W to 148° West Longitude  
Azimuth Range: 108.7° to 235.0°  
Corresponding Elevation Angles: 11.7° / 25.4°  
Antenna Centerline (AGL): 2.74 m / 9.0 ft

### Antenna Information

	Receive - FCC32	Transmit - FCC32
Manufacturer	Andrew	Andrew
Model	ES37MPK-1	ES37MPK-1
Gain / Diameter	52.1 dBi / 3.7 m	54.1 dBi / 3.7 m
3-dB / 15-dB Beamwidth	0.50° / 1.30°	0.32° / 0.78°

Max Available RF Power	(dBW/4 kHz)						
	(dBW/MHz)		(1) -7.8	(2) 14.8			
			16.2	38.8			

Maximum EIRP	(dBW/4 kHz)						
	(dBW/MHz)		46.3	68.9			
			70.3	92.9			

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 12.2 GHz	Transmit 17.3 GHz
Emission / Frequency Range (MHz)	800KG2D - 24M0G1W / 12200.0 - 12700.0	800KG2D - 24M0G1W / 17300.0 - 17800.0 NON/ 17300.0 - 17800.0

Max Great Circle Coordination Distance	303.8 km / 188.7 mi	282.0 km / 175.2 mi
Precipitation Scatter Contour Radius	520.2 km / 323.2 mi	528.3 km / 328.2 mi

# COMSEARCH

## Earth Station Data Sheet

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<b>Coordination Values</b>		<b>CHEYENNE, WY</b>	
Licensee Name		EchoStar Corporation	
Latitude (NAD 83)		41° 7' 54.4" N	
Longitude (NAD 83)		104° 44' 13.0" W	
Ground Elevation (AMSL)		1810.51 m / 5940.0 ft	
Antenna Centerline (AGL)		2.74 m / 9.0 ft	
Antenna Model		Andrew 3.7 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		14.8 (dBW/4 kHz)	

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 12.2 GHz		Transmit 17.3 GHz		Coordination Distance (km)
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)	
0	0.86	108.38	-10.00	184.48	-10.00		164.54
5	0.91	103.48	-10.00	182.05	-10.00		160.51
10	0.88	98.57	-10.00	183.37	-10.00		163.37
15	0.84	93.66	-10.00	185.92	-10.00		166.05
20	0.86	88.75	-10.00	184.48	-10.00		164.53
25	0.86	83.84	-10.00	184.68	-10.00		164.75
30	0.90	78.93	-10.00	182.44	-10.00		160.90
35	0.80	74.03	-10.00	187.77	-10.00		168.01
40	0.77	69.13	-10.00	189.57	-10.00		169.94
45	0.70	64.24	-10.00	192.91	-10.00		173.54
50	0.71	59.36	-10.00	192.55	-10.00		173.15
55	0.59	54.51	-10.00	198.25	-10.00		179.42
60	0.47	49.68	-10.00	202.66	-10.00		187.09
65	0.42	44.87	-9.30	209.41	-9.30		194.40
70	0.38	40.09	-8.08	218.52	-8.08		202.67
75	0.36	35.36	-6.71	226.59	-6.71		210.30
80	0.40	30.68	-5.17	229.61	-5.17		212.89
85	0.46	26.10	-3.42	232.14	-3.42		214.93
90	0.46	21.72	-1.42	242.63	-1.42		224.34
95	0.00	17.94	0.65	280.28	0.65		257.78
100	0.00	14.53	2.94	292.96	2.94		269.48
105	0.00	12.24	4.81	300.96	4.81		279.52
110	0.00	11.73	5.26	303.79	5.26		282.05
115	0.34	12.92	4.22	284.85	4.22		261.31
120	0.51	15.81	2.03	256.51	2.03		236.11
125	0.59	19.18	-0.07	240.37	-0.07		222.01
130	0.70	22.40	-1.76	225.79	-1.76		208.45
135	0.71	25.56	-3.19	218.68	-3.19		201.83
140	0.82	28.47	-4.36	207.99	-4.36		192.01
145	0.72	31.34	-5.40	208.06	-5.40		192.31
150	0.81	33.82	-6.23	203.21	-6.23		184.48
155	0.90	35.99	-6.91	195.90	-6.91		176.49
160	0.89	37.94	-7.48	194.04	-7.48		174.57
165	1.03	39.37	-7.88	186.05	-7.88		166.14
170	1.08	40.46	-8.17	183.15	-8.17		163.13
175	1.13	41.10	-8.35	180.63	-8.35		159.05
180	1.24	41.22	-8.38	177.03	-8.38		155.51
185	1.34	40.89	-8.29	174.28	-8.29		152.92



# COMSEARCH

## Earth Station Data Sheet

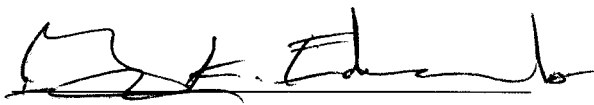
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Max Available RF Power	14.8 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 12.2 GHz		Transmit 17.3 GHz		Coordination Distance (km)
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)	
190	1.32	40.22	-8.11	175.79	-8.11	154.34	
195	1.37	39.04	-7.79	175.80	-7.79	154.33	
200	1.41	37.47	-7.34	176.82	-7.34	155.21	
205	1.41	35.56	-6.77	179.53	-6.77	157.72	
210	1.23	33.46	-6.11	187.92	-6.11	167.73	
215	1.27	30.90	-5.25	190.69	-5.25	170.48	
220	1.31	28.17	-4.25	194.02	-4.25	173.83	
225	1.24	26.06	-3.40	199.55	-3.40	179.73	
230	0.96	24.94	-2.92	207.75	-2.92	191.43	
235	0.99	24.42	-2.69	206.98	-2.69	190.54	
240	1.19	24.69	-2.82	203.50	-2.82	184.05	
245	0.87	26.37	-3.53	209.18	-3.53	193.10	
250	0.85	28.51	-4.38	206.49	-4.38	190.40	
255	0.90	31.21	-5.36	202.32	-5.36	183.28	
260	1.01	34.35	-6.40	193.09	-6.40	173.32	
265	1.23	37.77	-7.43	181.71	-7.43	160.05	
270	1.24	41.60	-8.48	176.65	-8.48	155.14	
275	1.45	45.53	-9.46	162.38	-9.46	144.63	
280	1.64	49.64	-10.00	153.86	-10.00	137.51	
285	1.49	53.97	-10.00	158.40	-10.00	141.29	
290	1.40	58.36	-10.00	161.57	-10.00	143.94	
295	1.66	62.72	-10.00	153.04	-10.00	136.83	
300	1.33	67.26	-10.00	166.25	-10.00	145.77	
305	1.11	71.80	-10.00	173.73	-10.00	152.38	
310	0.89	76.34	-10.00	182.94	-10.00	161.43	
315	0.73	80.88	-10.00	191.52	-10.00	172.03	
320	0.62	85.42	-10.00	196.86	-10.00	177.87	
325	0.69	89.96	-10.00	193.22	-10.00	173.88	
330	0.70	94.50	-10.00	193.10	-10.00	173.75	
335	0.79	99.04	-10.00	188.25	-10.00	168.52	
340	0.95	103.58	-10.00	179.65	-10.00	158.07	
345	0.85	108.08	-10.00	185.02	-10.00	165.11	
350	0.84	112.56	-10.00	185.56	-10.00	165.67	
355	1.08	113.30	-10.00	174.69	-10.00	153.27	

## 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: January 05, 2015