

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for

**KVH Industries, Inc.
Middletown, Rhode Island**

Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, Virginia 20147
October 31, 2013

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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

None

No 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.

Expedited coordination data for this earth station was emailed and sent to the below listed carriers with a letter dated October 17, 2013.

Company

ALGONQUIN GAS TRANSMISSION CO
AT&T Corporation
Catholic Media, Inc
Cellco Partnership - CT, W-MA, VT
Cellco Partnership - E-MA, NH, RI
Connecticut State Police Department
Coralinks
ECW Wireless, LLC
Firstlevel Networks
Greater Boston Police Council
Industrial Tower and Wireless, LLC
MCIMetro Access Transmission Svcs LLC
Massachusetts Department of State Police
Massachusetts, Commonwealth of
NSTAR Electric Company
National Grid USA Service Company, Inc
New Cingular Wireless PCS LLC - MA
New Cingular Wireless PCS LLC-DE/NH/RI
New Cingular Wireless PCS, LLC (NY)
Northeast Utilities Services Company
Open Line Communications
RHODE ISLAND STATE OF
SCS Networks
STOP & SHOP COMPANIES
Suffolk, County of
Verizon New England Inc.
WHDH-TV

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: 10/31/2013
Job Number: 131017COMSJC01

Administrative Information

Status ENGINEER PROPOSAL
Call Sign
Licensee Code KVHIND
Licensee Name KVH Industries, Inc.

Site Information MIDDLETOWN, RHODE ISLAND

Venue Name
Latitude (NAD 83) 41° 31' 17.0" N
Longitude (NAD 83) 71° 17' 29.0" W
Climate Zone A
Rain Zone 2
Ground Elevation (AMSL) 33.83 m / 111.0 ft

Link Information

Satellite Type Geostationary
Mode TR - Transmit-Receive
Modulation Digital
Satellite Arc 25° W to 135° West Longitude
Azimuth Range 122.4° to 251.9°
Corresponding Elevation Angles 23.2° / 10.8°
Antenna Centerline (AGL) 1.52 m / 5.0 ft

Antenna Information

Manufacturer KVH Industries, Inc.
Model 1.0 Meter
Gain / Diameter 31.3 dBi / 1.0 m
3-dB / 15-dB Beamwidth 2.20° / 4.00°

Receive

Transmit

KVH Industries, Inc.
1.0 Meter
34.5 dBi / 1.0 m
1.50° / 2.95°

Max Available RF Power (dBW/4 kHz) -21.5
(dBW/MHz) 2.5

Maximum EIRP (dBW/4 kHz) 13.0
(dBW/MHz) 37.0

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 - 36M0G7D / 3700.0 - 4200.0

Receive 4.0 GHz

Transmit 6.1 GHz

1M00G7D - 36M0G7D / 5925.0 - 6425.0

Max Great Circle Coordination Distance 403.9 km / 250.9 mi 158.3 km / 98.3 mi
Precipitation Scatter Contour Radius 536.0 km / 333.0 mi 100.0 km / 62.1 mi

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Coordination Values

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Ground Elevation (AMSL) 33.83 m / 111.0 ft
Antenna Centerline (AGL) 1.52 m / 5.0 ft
Antenna Model KVH Industries, Inc. 1.0 Meter
Antenna Mode Receive 4.0 GHz Transmit 6.1 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 -21.5 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	1.17	107.87	-10.00	215.13	-10.00	100.00
5	1.33	112.80	-10.00	210.24	-10.00	100.00
10	1.67	110.73	-10.00	203.31	-10.00	100.00
15	1.88	106.15	-10.00	197.71	-10.00	100.00
20	1.93	101.51	-10.00	196.40	-10.00	100.00
25	1.93	96.86	-10.00	196.30	-10.00	100.00
30	2.36	92.21	-10.00	186.34	-10.00	100.00
35	2.58	87.53	-10.00	181.12	-10.00	100.00
40	2.43	82.86	-10.00	184.63	-10.00	100.00
45	2.66	78.18	-10.00	179.40	-10.00	100.00
50	3.16	73.46	-10.00	166.03	-10.00	100.00
55	3.40	68.76	-10.00	160.58	-10.00	100.00
60	3.23	64.15	-10.00	164.32	-10.00	100.00
65	3.05	59.57	-10.00	170.20	-10.00	100.00
70	2.81	55.07	-10.00	175.96	-10.00	100.00
75	2.43	50.69	-10.00	184.63	-10.00	100.00
80	2.10	46.41	-9.67	193.89	-9.67	100.00
85	2.48	41.96	-8.57	190.37	-8.57	100.00
90	2.76	37.66	-7.40	189.89	-7.40	100.00
95	2.69	33.69	-6.19	197.34	-6.19	100.00
100	2.74	29.92	-4.90	202.45	-4.90	100.00
105	2.67	26.61	-3.63	207.75	-3.63	100.00
110	2.24	24.16	-2.58	223.28	-2.58	100.00
115	1.78	22.56	-1.83	240.75	-1.83	100.00
120	1.71	21.57	-1.35	246.17	-1.35	100.00
125	1.77	21.54	-1.33	244.23	-1.33	100.00
130	1.48	22.92	-2.01	249.83	-2.01	100.00
135	1.30	25.09	-2.99	250.12	-2.99	100.00
140	1.02	28.02	-4.19	252.70	-4.19	100.00
145	0.91	30.87	-5.24	252.43	-5.24	100.00
150	0.69	33.57	-6.15	260.67	-6.15	100.00
155	0.57	35.91	-6.88	263.81	-6.88	100.00
160	0.25	38.12	-7.53	294.57	-7.53	115.23
165	0.00	39.92	-8.03	298.12	-8.03	118.28
170	0.00	41.08	-8.34	296.05	-8.34	117.48
175	0.00	41.79	-8.53	294.82	-8.53	117.00
180	0.00	42.03	-8.59	294.41	-8.59	116.84

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Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
185	0.00	41.79	-8.53	294.82	-8.53	117.00
190	0.00	41.08	-8.34	296.05	-8.34	117.48
195	0.00	39.92	-8.03	298.12	-8.03	118.28
200	0.31	38.07	-7.52	287.42	-7.52	110.66
205	0.49	35.99	-6.90	270.17	-6.90	100.00
210	0.51	33.72	-6.20	272.63	-6.20	100.00
215	0.44	31.25	-5.37	285.31	-5.37	105.60
220	0.59	28.36	-4.32	279.63	-4.32	100.00
225	0.89	25.16	-3.02	268.16	-3.02	100.00
230	1.02	21.93	-1.53	270.35	-1.53	100.00
235	0.86	18.77	0.17	292.54	0.17	100.00
240	0.00	15.98	1.91	371.43	1.91	144.40
245	0.00	12.80	4.32	390.13	4.32	152.40
250	0.00	10.98	5.98	403.87	5.98	158.30
255	0.00	11.27	5.71	401.56	5.71	157.29
260	0.00	13.51	3.73	385.95	3.73	150.37
265	0.00	16.96	1.26	366.37	1.26	142.38
270	0.00	21.03	-1.07	348.47	-1.07	135.50
275	0.00	25.42	-3.13	333.18	-3.13	131.16
280	0.00	29.99	-4.92	320.23	-4.92	126.38
285	0.00	34.67	-6.50	308.53	-6.50	122.25
290	0.00	39.42	-7.89	299.04	-7.89	118.63
295	0.00	44.21	-9.14	290.82	-9.14	115.43
300	0.00	49.04	-10.00	285.28	-10.00	113.23
305	0.00	53.90	-10.00	285.28	-10.00	113.23
310	0.00	58.77	-10.00	285.28	-10.00	113.23
315	0.00	63.65	-10.00	285.28	-10.00	113.23
320	0.00	68.54	-10.00	285.28	-10.00	113.23
325	0.00	73.44	-10.00	285.28	-10.00	113.23
330	0.22	78.34	-10.00	282.17	-10.00	111.26
335	0.34	83.25	-10.00	268.21	-10.00	102.24
340	0.64	88.17	-10.00	240.98	-10.00	100.00
345	0.61	93.09	-10.00	242.86	-10.00	100.00
350	0.64	98.01	-10.00	240.88	-10.00	100.00
355	0.67	102.93	-10.00	239.07	-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.



Jeffrey E. Cowles
Engineer III, Telecommunications
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, Va. 20147

DATED: October 31, 2013