

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
TELECOMMUNICATION SYSTEMS, INC
MANASSAS, VA
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
June 01, 2012

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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

Cellco Partnership-Newark-Dallas Verizon

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.

Company

AT&T COMMUNICATIONS OF MARYLAND INC
AT&T COMMUNICATIONS OF VIRGINIA INC
AT&T CORP
Alltel Communications LLC-Southern VA
Alltel Communications of Petersburg Inc
Appalachia Engineering Services
Atlantic Broadband (Delmar), LLC
Atlantic Broadband (Penn), LLC
B20 LLC
Baltimore County of Maryland
Baltimore Gas and Electric Company
Blue Ridge Carriers
COLLEGE OF SOUTHERN MARYLAND
Capital Communications of America
Cellco Partnership - Southern Virginia
Cellco Partnership-Newark-Dallas Verizon
Cellco Partnership-WA/Baltimore
Charles, County of
Chesterfield, County of
Comprehensive Wireless LLC
Conterra Ultra Broadband, LLC
County of Frederick
County of Stafford
ECW Wireless, LLC
Eastern MLG LLC
Enoch Pratt Free Library
FELHC, Inc.
Frederick County
Fundamental Broadcasting LLC
Garden State Transmissions
Goochland County
HENRICO COUNTY
Hanover, County of
Hardy Cellular Telephone Company
Harrisonburg-Rockingham ECC
King and Queen County
Loudoun, County of
MCI Communications Services Inc.
METROPOLITAN AREA NETWORKS, INC.
MVC Research. LLC

Maryland Public Broadcasting Commission
Maryland State Highway Administration
Maryland, State of - Dept.of Info & Tech
National Radio Astronomy Observatory
New Cingular Wireless PCS LLC - DC
New Cingular Wireless PCS LLC - VA
New Cingular Wireless PCS LLC- WV/NC/SC
New Cingular Wireless PCS, LLC - PA
New Kent County
Norfolk Southern Railway
Northern Virginia Electric Cooperative
Prince George's County
Prince William, County of
RAPPAHANNOCK ELECTRIC COOPERATIVE
RCTC Wholesale Corporation
RICHMOND, CITY OF
SCTF NET
SHENANDOAH VALLEY ELECTRIC COOPERATIVE
Southern Maryland Electric Cooperative I
St. Mary's County of
State of Maryland, MIEMSS
State of WV DHHR/BPH STECS
Thought Transmissions, LLC
USCOC of Cumberland, Inc.
USCOC of Virginia RSA #2, Inc.
USCOC of Virginia RSA #3, Inc.
Verizon Maryland, Inc.
Verizon Wireless VAW LLC-Southern VA
Virginia Broadband, LLC
Virginia Cellular LLC
Virginia Department of State Police
Virginia Electric & Power Company
Virginia PCS Alliance, L.C.
WASHINGTON SUBURBAN SANITARY COMMISSION
Washington D.C. SMSA L.P.
Washington Gas Light Company
World Class Wireless LLC
iSignal

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: 06/01/2012
Job Number: 120601COMSTC02

Administrative Information

Licensee Name TELECOMMUNICATION SYSTEMS, INC

Site Information

MANASSAS, VA

Latitude (NAD 83) 38° 43' 55.0" N
Longitude (NAD 83) 77° 31' 50.7" W
Climate Zone A
Rain Zone 2
Ground Elevation (AMSL) 58.4 m / 191.6 ft

Link Information

Satellite Type Geostationary
Mode TR - Transmit-Receive
Modulation Digital
Satellite Arc 18°W to 139°West Longitude
Azimuth Range 110.2° to 251.2°
Corresponding Elevation Angles 14.9° / 13.4°
Antenna Centerline (AGL) 3.1 m / 10.2 ft

Antenna Information

Receive

Transmit

Manufacturer	Vertex	Vertex
Gain / Diameter	46.5 dBi / 6.3 m	50.4 dBi / 6.3 m
3-dB / 15-dB Beamwidth	0.80° / 1.60°	0.50° / 1.00°

Max Available RF Power	(dBW/4 kHz)	-12.2
	(dBW/MHz)	11.8

Maximum EIRP	(dBW/4 kHz)	38.2
	(dBW/MHz)	62.2

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

Receive 4.0 GHz

Transmit 6.1 GHz

Emission / Frequency Range (MHz)	4M00G7W / 3700.0 - 4200.0	30M0G7W / 5925.0 - 6425.0
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Max Great Circle Coordination Distance	342.2 km / 212.6 mi	160.7 km / 99.9 mi
Precipitation Scatter Contour Radius	524.7 km / 326.0 mi	100.0 km / 62.1 mi

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Coordination Values

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Latitude (NAD 83) 38° 43' 55.0" N
Longitude (NAD 83) 77° 31' 50.7" W
Ground Elevation (AMSL) 58.4 m / 191.6 ft
Antenna Centerline (AGL) 3.1 m / 10.2 ft
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 -12.2 (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	0.60	108.30	-10.00	243.57	-10.00	109.04
5	0.62	104.73	-10.00	242.31	-10.00	108.12
10	0.57	99.89	-10.00	245.49	-10.00	110.45
15	0.55	95.05	-10.00	246.55	-10.00	111.22
20	0.55	90.20	-10.00	246.56	-10.00	111.22
25	0.54	85.36	-10.00	247.43	-10.00	111.86
30	0.67	80.51	-10.00	238.75	-10.00	105.46
35	0.83	75.66	-10.00	229.57	-10.00	100.00
40	0.84	70.83	-10.00	229.21	-10.00	100.00
45	1.05	65.98	-10.00	218.62	-10.00	100.00
50	1.11	61.15	-10.00	216.75	-10.00	100.00
55	1.11	56.35	-10.00	216.75	-10.00	100.00
60	1.13	51.57	-10.00	216.13	-10.00	100.00
65	1.19	46.81	-9.76	215.69	-9.76	100.00
70	1.12	42.12	-8.61	223.57	-8.61	100.00
75	0.92	37.55	-7.36	239.08	-7.36	101.54
80	0.83	33.04	-5.98	252.78	-5.98	109.21
85	0.81	28.65	-4.43	263.86	-4.43	114.54
90	0.77	24.49	-2.72	277.98	-2.72	121.33
95	0.77	20.64	-0.87	291.09	-0.87	126.79
100	0.77	17.37	1.01	305.13	1.01	132.40
105	0.53	15.27	2.41	334.52	2.41	147.77
110	0.53	14.37	3.06	339.77	3.06	150.15
115	0.53	15.13	2.50	335.29	2.50	148.12
120	0.36	17.46	0.95	342.20	0.95	156.98
125	0.32	20.65	-0.87	333.52	-0.87	154.35
130	0.00	24.35	-2.66	336.61	-2.66	160.72
135	0.00	27.68	-4.05	326.45	-4.05	155.63
140	0.00	30.85	-5.23	318.03	-5.23	151.52
145	0.00	33.83	-6.23	310.38	-6.23	148.15
150	0.00	36.56	-7.08	304.56	-7.08	145.41
155	0.00	39.01	-7.78	299.80	-7.78	143.18
160	0.00	41.11	-8.35	295.99	-8.35	141.42
165	0.00	42.83	-8.79	293.07	-8.79	140.08
170	0.00	44.10	-9.11	291.00	-9.11	139.13
175	0.29	44.60	-9.23	279.01	-9.23	132.47
180	0.00	45.15	-9.37	289.34	-9.37	138.38
185	0.00	44.88	-9.30	289.76	-9.30	138.57

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Short Term -146.0 dBW/MHz 0.01% -131.0 dBW/4 kHz 0.0025%
Max Available RF Power -12.2 (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)
190	0.27	43.84	-9.05	282.71	-9.05	133.39
195	0.64	42.24	-8.64	248.96	-8.64	110.88
200	0.31	40.84	-8.28	282.28	-8.28	133.20
205	0.22	38.82	-7.73	297.09	-7.73	141.16
210	0.45	36.20	-6.97	274.06	-6.97	125.64
215	0.60	33.37	-6.08	267.22	-6.08	119.52
220	0.51	30.48	-5.10	279.74	-5.10	126.44
225	0.39	27.40	-3.94	302.10	-3.94	138.07
230	0.67	23.87	-2.45	286.96	-2.45	126.83
235	0.74	20.37	-0.72	294.63	-0.72	128.83
240	0.91	16.74	1.41	298.53	1.41	127.41
245	0.72	14.11	3.26	327.08	3.26	140.58
250	0.77	12.71	4.40	333.19	4.40	142.42
255	0.85	13.11	4.06	324.17	4.06	136.98
260	0.89	15.26	2.41	307.58	2.41	131.26
265	0.98	18.49	0.33	285.61	0.33	121.01
270	1.05	22.37	-1.74	267.81	-1.74	112.76
275	0.99	26.67	-3.65	257.54	-3.65	108.83
280	0.94	31.16	-5.34	249.53	-5.34	105.94
285	1.18	35.69	-6.81	231.54	-6.81	100.00
290	1.24	40.37	-8.15	222.32	-8.15	100.00
295	1.25	45.11	-9.36	215.84	-9.36	100.00
300	1.14	49.93	-10.00	215.88	-10.00	100.00
305	0.90	54.78	-10.00	225.49	-10.00	100.00
310	0.58	59.65	-10.00	244.39	-10.00	109.64
315	0.39	64.51	-10.00	262.58	-10.00	122.48
320	0.30	69.37	-10.00	272.85	-10.00	129.48
325	0.46	74.21	-10.00	254.64	-10.00	116.92
330	0.64	79.07	-10.00	241.08	-10.00	107.20
335	0.83	83.94	-10.00	229.91	-10.00	100.00
340	0.87	88.82	-10.00	227.61	-10.00	100.00
345	0.60	93.69	-10.00	243.43	-10.00	108.94
350	0.55	98.57	-10.00	246.32	-10.00	111.05
355	0.66	103.44	-10.00	239.54	-10.00	106.05

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.

Timothy O. Crutcher
Frequency Planner
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147

DATED: June 01, 2012