

# 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  
Washington D.C. SMSA L.P.

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  
BAY BROADBAND COMMUNICATIONS 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  
DELAWARE STATE - DTI  
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 - Maryland  
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

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### Administrative Information

Licensee Name TELECOMMUNICATION SYSTEMS, INC

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### 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

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### 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) 4.27 m / 14.0 ft

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### Antenna Information

#### Receive

#### Transmit

Manufacturer	Vertex	Vertex	
Gain / Diameter	50.3 dBi / 9.3 m	53.9 dBi / 9.3 m	
3-dB / 15-dB Beamwidth	0.54° / 1.20°	0.50° / 1.00°	
Max Available RF Power (dBW/4 kHz)		-12.2	
(dBW/MHz)		11.8	
Maximum EIRP (dBW/4 kHz)		41.7	
(dBW/MHz)		65.7	
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%

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### Frequency Information

#### Receive 4.0 GHz

#### Transmit 6.1 GHz

Emission / Frequency Range (MHz)	4M00G7W / 3700.0 - 4200.0	30M0G7W / 5925.0 - 6425.0
Max Great Circle Coordination Distance	366.0 km / 227.4 mi	173.2 km / 107.6 mi
Precipitation Scatter Contour Radius	524.7 km / 326.0 mi	100.0 km / 62.1 mi



# COMSEARCH

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### Coordination Values

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Licensee Name TELECOMMUNICATION SYSTEMS, INC  
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) 4.27 m / 14.0 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	0.49	108.29	-10.00	251.21	-10.00	114.49
5	0.52	104.72	-10.00	248.49	-10.00	112.62
10	0.45	99.88	-10.00	255.65	-10.00	117.64
15	0.45	95.05	-10.00	254.85	-10.00	117.08
20	0.45	90.20	-10.00	254.86	-10.00	117.08
25	0.42	85.36	-10.00	259.08	-10.00	120.04
30	0.54	80.52	-10.00	247.24	-10.00	111.72
35	0.64	75.68	-10.00	240.98	-10.00	107.12
40	0.68	70.84	-10.00	238.50	-10.00	105.27
45	0.82	66.00	-10.00	230.39	-10.00	100.00
50	0.88	61.18	-10.00	226.96	-10.00	100.00
55	0.91	56.38	-10.00	225.23	-10.00	100.00
60	0.94	51.61	-10.00	223.75	-10.00	100.00
65	1.03	46.85	-9.77	220.53	-9.77	100.00
70	0.96	42.17	-8.62	229.50	-8.62	100.00
75	0.76	37.60	-7.38	248.59	-7.38	108.59
80	0.59	33.13	-6.01	268.07	-6.01	119.99
85	0.53	28.78	-4.48	282.40	-4.48	127.21
90	0.45	24.67	-2.80	302.36	-2.80	136.23
95	0.45	20.86	-0.98	316.39	-0.98	141.97
100	0.35	17.71	0.79	342.92	0.79	157.90
105	0.30	15.48	2.26	360.53	2.26	170.27
110	0.30	14.60	2.89	366.03	2.89	173.18
115	0.32	15.33	2.36	359.29	2.36	168.99
120	0.35	17.48	0.94	344.32	0.94	158.68
125	0.23	20.72	-0.91	346.23	-0.91	164.57
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	0.24	44.65	-9.25	285.53	-9.25	135.58
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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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)
190	0.23	43.88	-9.06	287.26	-9.06	136.47
195	0.58	42.30	-8.66	252.82	-8.66	113.59
200	0.26	40.88	-8.29	288.14	-8.29	135.87
205	0.00	39.01	-7.78	299.80	-7.78	143.18
210	0.37	36.26	-6.99	283.40	-6.99	131.92
215	0.52	33.43	-6.10	272.49	-6.10	123.17
220	0.43	30.53	-5.12	288.51	-5.12	132.29
225	0.36	27.42	-3.95	305.21	-3.95	140.22
230	0.61	23.91	-2.46	290.56	-2.46	129.21
235	0.68	20.40	-0.74	298.22	-0.74	131.18
240	0.85	16.78	1.38	302.43	1.38	129.97
245	0.67	14.16	3.23	330.62	3.23	143.13
250	0.74	12.74	4.37	335.00	4.37	143.74
255	0.82	13.14	4.03	326.09	4.03	138.30
260	0.86	15.29	2.39	309.66	2.39	132.62
265	0.94	18.51	0.31	287.95	0.31	122.58
270	1.01	22.39	-1.75	269.15	-1.75	113.69
275	0.95	26.69	-3.66	259.79	-3.66	110.43
280	0.90	31.18	-5.35	252.38	-5.35	107.92
285	1.13	35.70	-6.82	232.95	-6.82	100.00
290	1.19	40.38	-8.15	223.81	-8.15	100.00
295	1.20	45.13	-9.36	217.26	-9.36	100.00
300	1.10	49.93	-10.00	217.33	-10.00	100.00
305	0.86	54.79	-10.00	228.13	-10.00	100.00
310	0.55	59.66	-10.00	246.70	-10.00	111.33
315	0.35	64.52	-10.00	267.21	-10.00	125.66
320	0.29	69.37	-10.00	274.33	-10.00	130.47
325	0.43	74.21	-10.00	257.96	-10.00	119.27
330	0.60	79.07	-10.00	243.35	-10.00	108.88
335	0.79	83.94	-10.00	231.85	-10.00	100.21
340	0.83	88.82	-10.00	229.53	-10.00	100.00
345	0.57	93.69	-10.00	245.42	-10.00	110.40
350	0.50	98.56	-10.00	249.65	-10.00	113.46
355	0.64	103.44	-10.00	240.99	-10.00	107.14

## 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