

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
DIRECTV Enterprises, LLC
WINCHESTER, VA -ECUF
(9.2 Meter)
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
December 10, 2014

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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 whether by pathloss profiles or measurements.

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 10/17/2014.

Company

256Q Networks
3G Wireless, LLC
ACC License, LLC
Access MLP Operating LLC
Adams County Department of Emergency Svc
AERIAL VIDEO SYSTEMS
Affiniti PA, LLC
Airband Communications Inc
Alascom Inc
Albermarle, County of, Virginia
ALLEGANY COLLEGE OF MARYLAND
Alltel Communications LLC-Southern VA
Alltel Communications of Petersburg Inc
American Broadcasting Companies, Inc.
Anadarko Petroleum Corporation
Antietam Cable Television
Ascent Media Network Services, LLC
AT&T California
AT&T COMMUNICATIONS OF MARYLAND INC
AT&T Corporation
Atlantic Broadband (Penn), LLC
Auburn Data Systems, LLC
BALTIMORE CITY DEPARTMENT OF PUBLIC WORK
Baltimore County of Maryland
Baltimore Gas and Electric Company
BAY BROADBAND COMMUNICATIONS LLC
Bedford, County of
Believe Wireless, LLC
Bellsouth Telecommunications, Inc.
Berks County Department of Emergency Ser
BLAIR COUNTY 911
Blaze Broadband
Blue Ridge Carriers
Borgeson, Tom R.
Broadcast Sports Inc.
Buggs Island Telephone Cooperative, Inc.
Cambria, County of
Capital Communications of America
Carolina Telephone and Telegraph Co
Caroline County Public Works
Casper, John

CBS Communication Services Inc
CBS TELEVISION LICENSES LLC
Cellco Partnership - Bridgeville, PA/WV
Cellco Partnership - Southern Virginia
Cellco Partnership- PA Region
Cellco Prtnrshp - Phil. Tri-State Rgn
Central Virginia Electric Cooperative
CenturyTel of the Southwest, Inc.
Chester, County of
Chesterfield, County of
Chicago Comnet Corp
Cincinnati Bell Wireless LLC
CISLUNAR NETWORKS CORPORATION
City of Laurel
Citynet
Citywide News Network, Inc.
Clearwire Spectrum Holdings II, LLC
Clearwire Spectrum Holdings III, LLC
Clearwire Spectrum Holdings LLC
CNG Communications, Inc.
CNN America, Inc.
Cohen, Elena
Commonwealth of Pennsylvania-Radio Proj.
Comprehensive Wireless LLC
Conterra Ultra Broadband, LLC
Converge Towers LLC
Coralinks
County of Dinwiddie, Virginia
County of York
Cowboys Stadium LP
C-SPAN
CTVN HARRISBURG, LLC
Cumberland, County of
D&E Communications, Inc.
DAUPHIN COUNTY EMERGENCY MANAGEMENT
DCI II, INC.
Delaware Division of Communications
Detroit Free Press, Inc.
Direct Broadcast Services, Inc.
ECW Wireless, LLC
Eduro Networks LLC
Enoch Pratt Free Library
Entravision Holdings, LLC
Exelon Generation Company, LLC
F Corporation
FELHC
FiberTower Network Services Corp.-DIP
Franklin County Dept. of Emergency Servi
Frederick County
Fundamental Broadcasting LLC
Garden State Transmissions
GEORGE MASON UNIVERSITY INSTR FNCTION
GETWIRELESS.NET
Global Microwave Systems Inc
Globecom License Sub LLC
GOODYEAR TIRE AND RUBBER COMPANY

Grant, County of
Gray Television Licensee LLC (Gray TV)
Gray Television Licensee, Inc (WCAV)
Gray Television Licensee, LLC
GSN New, Inc
GWETA, Inc.
Hallco Unlimited, Inc.
Hanover, County of
Hardy Cellular Telephone Company
Hardy Telecommunications
Harrisonburg-Rockingham ECC
Hawaiian Telcom, Inc.
Heiden, William
HENRICO COUNTY
HF Enterprises, Inc
High Voltage Communications LLC
Howard University
HOWARD UNIVERSITY TELEVISION - (WHUT-TV)
Huntingdon County of
Illinois Bell Telephone Company
Indiana Bell Telephone Company
INDIANA, COUNTY OF
Information & Display Systems, Inc.
Information Super Station, LLC
International Communications Group, Inc.
iSignal
Jefferson Microwave, LLC
Juniata County Emergency Services
Kentucky RSA #3 Cellular General Partner
Kentucky RSA #4 Cellular General Partner
King George County
Lancaster County-Wide Communications
Loudoun County Public Schools
Loudoun Wireless LLC
Loudoun, County of
LOWER SHORE BROADBAND COOPERATIVE
M&T Bank
Maryland Port Administration
Maryland Public Broadcasting Commission
Maryland State Highway Administration
Maryland, State of - Dept.of Info & Tech
MERCURY COMMUNICATIONS
Metro Networks Communications, Inc.
Michigan Bell Telephone Company
Middle East Broadcasting Networks, Inc.
Mifflin County
Mifflin Mobilecom
Millersburg Area School District
MIT LINCOLN LABORATORY
MLS Engineering
Montgomery, County of
Moreen, Steven K
Motorola Solutions, Inc.
Multimedia Holdings Corporation
MVC Research. LLC
National Cable Satellite Corporation

National Tower Company LLC
Navajo Communications Company
NBC Telemundo License LLC
Nelson, County of
Netrepid, Inc.
New Cingular Wireless PCS - Maryland
New Cingular Wireless PCS LLC - DC
New Cingular Wireless PCS LLC - Georgia
New Cingular Wireless PCS LLC - VA
New Cingular Wireless PCS LLC- WV/NC/SC
New Cingular Wireless PCS LLC-DE/NH/RI
New Cingular Wireless PCS, LLC - PA
NEW ENGLAND DIGITAL DISTRIBUTION, INC.
NEW ENGLAND SATELLITE SYSTEMS INC
New Kent County
Nextlink Wireless, LLC
Norfolk Southern Railway
NOROC Broadband LLC
Northern Virginia Electric Cooperative
Northumberland, County of
NorthWest Suburbs Community Access Corp
NSM Surveillance
Old Dominion LLC
On Scene Video Production
Onboard Images
Pacific and Southern Company, Inc.
Page County Broadband Authority
PEG Bandwidth, LLC
Penn Service Microwave Co., Inc.
Pennsylvania Sports Entertainment Netwo.
Pennsylvania Turnpike Commission
Petersburg Cellular Partnership
Petersburg Police Department
PhillieCo, L.P.
Pitt Power
Plateau Telecommunications, Inc.
Plum TV, LLC
Pontis Communications, Inc.
Port Networks, LLC
Prince William, County of
Production & Satellite Services, Inc.
Public Broadcasting Service
Public Television Communications Center
QUICK LINK CONNECTIONS INC
Qwest Corporation
Radio One Inc
RADIO ONE, INC - MD
Radiofone, Inc.
Randy Hermes Production
RapidDSL & Wireless, Inc.
RAYTHEON COMPANY
RCC Minnesota Inc. - MN NE ND SD
RCTC Wholesale Corporation
Regulus Media Services, Inc.
Remote Broadcasts, Inc.
REMOTE FACILITIES CONSULTING SERVICES

Rendezvous Communications LLC
RF Central, LLC
RF Film, Inc
Rural Broadband Network Services LLC
SBE Coordinator
SCTF NET
SECOM NET
Shenandoah Personal Communications, LLC
SOMERSET COUNTY
Somerset County, Maryland
Southern Maryland Electric Cooperative I
Southwestern Bell Telephone L.P.
Speedshotz, Inc
Spotsylvania, County of
Sprint Spectrum L.P.
Sprintcom, Inc
Stafford, County of
Standard Backhaul Communications LLC
State of Maryland, MIEMSS
Telecom Transport Management, Inc
Telegia Communications Inc.
Thought Transmissions, LLC
T-Mobile License LLC
Total RF Marketing Inc
Turtle Networks 6559
Turtle Networks 6562
TWO WAY RADIO INC.
Union, County Of
Unisat, Inc.
United Telephone - Southeast
USCOC of Cumberland, Inc.
USCOC of Virginia RSA #2, Inc.
USCOC of Virginia RSA #3, Inc.
Valley Rural Electric Cooperative, Inc.
Velox Networks LLC
Verizon California Inc.
Verizon Maryland, Inc.
Verizon New England Inc.
Verizon New Jersey, Inc.
Verizon New York, Inc.
Verizon North Inc.
Verizon Northwest Inc.
Verizon Pennsylvania, Inc.
VERIZON SOUTH INC.
Verizon Virginia, Inc.
Verizon Washington DC, Inc.
Verizon Wireless (VAW) LLC - Maryland
Verizon Wireless (VAW) LLC - W/B/V Mkts
Verizon Wireless (VAW) LLC-Pennsylvania
Verizon Wireless VAW LLC-Southern VA
Village Video Productions Inc
Virginia Broadband, LLC
Virginia Department of State Police
Virginia Electric & Power Company
Virginia Everywhere, LLC
Virginia PCS Alliance, L.C.

Virginia Region 2000 Local Govt Council
Virginia Tech Foundation , Inc.
Vyvx, LLC
Warrenton Fauquier Joint Communications
Washington County Public Schools
Washington Gas Light Company
Washington Suburban Sanitary Commission
WBAL HEARST-ARGYLE TV, INC. (CA CORP.)
WDCW, LLC
West Virginia Media Holdings, LLC
West Virginia PCS Alliance, L.C.
WEST VIRGINIA RADIO CORPORATION
Westar Satellite Services LP
Western PA Internet Access, Inc.
Western Technical Services
Wexler Video, Inc.
WICOMICO BOARD OF EDUCATION
Winged Vision Inc
Wireless Internetnetwork LLC
Wisconsin Bell, Inc.
WMTM, LLC
Wolfe Air Aviation
World Class Wireless, LLC
WV DHHR BPH, Office of EMS, Com. Div.
York County
Zen Networks, 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.

COMSEARCH

Earth Station Data Sheet

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

Date: 10/17/2014
Job Number: <PCNJobCode>

Administrative Information

Status: ENGINEER PROPOSAL
Call Sign: <PCNCallSign>
Licensee Code: ZDIRTV
Licensee Name: DIRECTV Enterprises, LLC

Site Information

WINCHESTER, VA
Venue Name: ECUF
Latitude (NAD 83): 39° 7' 56.1" N
Longitude (NAD 83): 78° 12' 7.0" W
Climate Zone: A
Rain Zone: 2
Ground Elevation (AMSL): 244.69 m / 802.8 ft

Link Information

Satellite Type: Geostationary
Mode: TR - Transmit-Receive
Modulation: Digital
Satellite Arc: 43° W to 79° West Longitude
Azimuth Range: 131.8° to 181.3°
Corresponding Elevation Angles: 32.0° / 44.7°
Antenna Centerline (AGL): 5.49 m / 18.0 ft

Antenna Information

	Receive - FCC32	Transmit - FCC32
Manufacturer	General Dynamics	General Dynamics
Model	9.2 Meter	9.2 Meter
Gain / Diameter	58.8 dBi / 9.2 m	60.3 dBi / 9.2 m
3-dB / 15-dB Beamwidth	0.20° / 0.48°	0.18° / 0.41°
Max Available RF Power	(dBW/4 kHz) (dBW/MHz)	-0.8 23.2
Maximum EIRP	(dBW/4 kHz) (dBW/MHz)	59.5 83.5
Interference Objectives:	Long Term Short Term	-156.0 dBW/MHz 20% -146.0 dBW/MHz 0.01%
		-151.0 dBW/4 kHz 20% -128.0 dBW/4 kHz 0.0025%

Frequency Information

	Receive 11.0 GHz	Transmit 13.0 GHz
Emission / Frequency Range (MHz)	16K0G7D - 400KG7D / 10700.0 - 12200.0	16K0G7D - 400KG7D / 13750.0 - 14500.0 16K0G7D - 400KG7D / 13249.5
Max Great Circle Coordination Distance	251.7 km / 156.4 mi	169.4 km / 105.3 mi
Precipitation Scatter Contour Radius	480.2 km / 298.3 mi	142.6 km / 88.6 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
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Coordination Values		WINCHESTER, VA	
Licensee Name		DIRECTV Enterprises, LLC	
Latitude (NAD 83)		39° 7' 56.1" N	
Longitude (NAD 83)		78° 12' 7.0" W	
Ground Elevation (AMSL)		244.69 m / 802.8 ft	
Antenna Centerline (AGL)		5.49 m / 18.0 ft	
Antenna Model		General Dynamics 9.2 Meter	
Antenna Mode		Receive 11.0 GHz	Transmit 13.0 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		-0.8 (dBW/4 kHz)	

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 13.0 GHz		Coordination Distance (km)
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)	
0	0.38	124.61	-10.00	214.58	-10.00		135.05
5	0.33	120.68	-10.00	219.00	-10.00		139.31
10	0.00	116.57	-10.00	231.37	-10.00		151.74
15	0.00	112.50	-10.00	231.37	-10.00		151.74
20	0.22	108.43	-10.00	229.42	-10.00		149.73
25	0.00	104.21	-10.00	231.37	-10.00		151.74
30	0.00	100.01	-10.00	231.37	-10.00		151.74
35	0.00	95.78	-10.00	231.37	-10.00		151.74
40	0.00	91.54	-10.00	231.37	-10.00		151.74
45	0.00	87.30	-10.00	231.37	-10.00		151.74
50	0.00	83.07	-10.00	231.37	-10.00		151.74
55	0.00	78.84	-10.00	231.37	-10.00		151.74
60	0.00	74.65	-10.00	231.37	-10.00		151.74
65	0.00	70.49	-10.00	231.37	-10.00		151.74
70	0.00	66.38	-10.00	231.37	-10.00		151.74
75	0.00	62.33	-10.00	231.37	-10.00		151.74
80	0.00	58.37	-10.00	231.37	-10.00		151.74
85	0.00	54.51	-10.00	231.37	-10.00		151.74
90	0.00	50.78	-10.00	231.37	-10.00		151.74
95	0.00	47.22	-9.85	232.01	-9.85		152.25
100	0.00	43.87	-9.05	235.55	-9.05		155.08
105	0.00	40.79	-8.26	239.13	-8.26		157.96
110	0.00	38.04	-7.50	242.63	-7.50		160.79
115	0.00	35.70	-6.82	246.00	-6.82		164.91
120	0.00	33.86	-6.24	248.74	-6.24		167.09
125	0.00	32.61	-5.83	250.72	-5.83		168.65
130	0.00	32.01	-5.63	251.70	-5.63		169.41
135	0.00	32.10	-5.66	251.54	-5.66		169.29
140	0.00	32.89	-5.93	250.27	-5.93		168.30
145	0.00	34.31	-6.38	248.06	-6.38		166.55
150	0.00	36.29	-6.99	245.16	-6.99		164.23
155	0.00	38.64	-7.67	241.84	-7.67		160.15
160	0.00	40.72	-8.24	239.22	-8.24		158.03
165	0.00	42.41	-8.69	237.20	-8.69		156.41
170	0.00	43.67	-9.00	235.78	-9.00		155.27
175	0.00	44.44	-9.19	234.93	-9.19		154.59
180	0.00	44.70	-9.26	234.64	-9.26		154.36
185	0.00	44.81	-9.29	234.52	-9.29		154.26

COMSEARCH

Earth Station Data Sheet

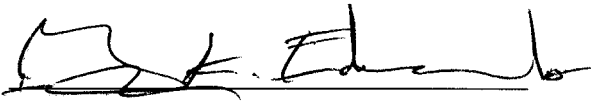
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Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz 20%
Short Term	-146.0 dBW/MHz	0.01%	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power		-0.8 (dBW/4 kHz)	

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 13.0 GHz		Coordination Distance (km)
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)		
190	0.00	45.36	-9.42	233.94	-9.42		153.79
195	0.00	46.32	-9.65	232.93	-9.65		152.98
200	0.00	47.68	-9.96	231.55	-9.96		151.89
205	0.00	49.40	-10.00	231.37	-10.00		151.74
210	0.00	51.44	-10.00	231.37	-10.00		151.74
215	0.00	53.76	-10.00	231.37	-10.00		151.74
220	0.00	56.32	-10.00	231.37	-10.00		151.74
225	0.00	59.09	-10.00	231.37	-10.00		151.74
230	0.00	62.04	-10.00	231.37	-10.00		151.74
235	0.25	65.02	-10.00	226.73	-10.00		146.99
240	0.35	68.21	-10.00	217.05	-10.00		137.42
245	0.40	71.54	-10.00	212.85	-10.00		133.41
250	0.35	74.97	-10.00	217.00	-10.00		137.37
255	0.42	78.43	-10.00	210.79	-10.00		131.49
260	0.47	81.95	-10.00	206.67	-10.00		128.95
265	0.47	85.52	-10.00	207.28	-10.00		129.51
270	0.46	89.10	-10.00	207.89	-10.00		130.07
275	0.53	92.68	-10.00	205.19	-10.00		125.33
280	0.56	96.26	-10.00	203.90	-10.00		124.13
285	0.70	99.84	-10.00	197.12	-10.00		117.95
290	0.70	103.36	-10.00	197.08	-10.00		117.92
295	1.22	106.99	-10.00	174.55	-10.00		100.00
300	1.42	110.49	-10.00	167.80	-10.00		100.00
305	1.37	113.83	-10.00	169.39	-10.00		100.00
310	1.53	117.16	-10.00	161.16	-10.00		100.00
315	1.22	120.12	-10.00	174.42	-10.00		100.00
320	1.18	123.04	-10.00	175.71	-10.00		100.48
325	0.94	125.62	-10.00	184.75	-10.00		107.52
330	0.84	128.06	-10.00	189.82	-10.00		111.67
335	0.65	130.14	-10.00	199.65	-10.00		120.21
340	0.75	132.15	-10.00	194.69	-10.00		115.83
345	0.60	133.59	-10.00	201.86	-10.00		122.23
350	0.52	132.12	-10.00	203.34	-10.00		125.84
355	0.43	128.43	-10.00	209.99	-10.00		130.74

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: December 10, 2014