

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
DIRECTV Enterprises, LLC
OAKDALE, MN
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
January 03, 2017

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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 12/20/2016.

Company

AT&T Mobility Spectrum LLC -IL/WI Mkts
AT&T Mobility Spectrum-MN/IA/ND/NE/MT/SD
AT&T Mobility Wireless Ops Hldgs - MN
AT&T Wireless Services 3 LLC - IL, WI
AT&T Wireless Services 3 LLC - MN
Affiniti LLC
Aitkin County Sheriff's Office
BFI Licenses, LLC
BNSF Railway Company
Barron, County of
Beefeater, LLC
Broadband Corp.
Bug Tussel Wireless LLC
Business Only Broadband, LLC
CHISAGO COUNTY SHERIFF'S OFFICE
COMMUNICATIONS ALTERNATIVES, INC.
COOPERATIVE LIGHT & POWER
CTC Telcom, Inc.
Casbah, LLC
Cerro Gordo County Court House
Chequamegon Communications Cooperative
City of Minneapolis
City of Plymouth
Clearwire Spectrum Holdings II, LLC
Clearwire Spectrum Holdings III, LLC
Compudyne Inc.
Country Wireless, LLC
County of Burnett
County of Ramsey
Crow Wing, County of
Douglas, County Of
Douglas, County of
Duluth Minnesota, City of
FMTC Wireless, Inc.
Fillmore, County of
First Security Band & Trust Company
Five Star Cooperative
Fixed Wireless Holdings, LLC
Florida High Speed Internet
GW Networks

Gardonville Cooperative Telephone Assn
Genesis Technology Communications, LLC
Goodhue, County of
HENNEPIN COUNTY
HOUSTON, COUNTY OF
Harvest Land Cooperative
Interstate Power and Light Company
Iowa Wireless Services LLC
Jackson, Count of
K-Communications Inc.
Kandiyohi, County of
Kingland Systems Corporation
LCC Design Services
LTD Broadband LLC
La Crosse, City Of
Le Sueur County of
Marathon, County of
Maximum Communications Cellular, LLP
Mayo Foundation for Medical Education
McLeod, County of
Minnesota Valley TV Improvement
Minnesota Wifi
Minnesota, State of (DOT)
National Tower Company LLC
Neit Services, LLC
New Cingular Wireless PCS LLC- Wisconsin
New Cingular Wireless PCS LLC-Minnesota
Nextera Wireless, LLC
Norlight Telecommunications, Inc
NorthfieldWiFi
Northwest Communications Inc.
Nsight Spectrum, LLC
Palmer Wireless, LLC
Pine County Sheriffs Department
RCC Minnesota Inc. - MN NE ND SD
RIVERLAND COMMUNICATIONS, INC.
Radio Link Internet
Regions Hospital
Rice County
Rimi Networks
ST Croix, County of
Saint Louis, County of
SBE Coordinator
Skybeam Acquisition Corporation
SpiraLight Networks, LLC
Sprint Spectrum L.P.
Sprintcom, Inc
Starcom, Inc.
Starwire Technologies
State of Wisconsin Ed Comm Board
Stearns, County of
T-Mobile License LLC
Taylor County of
Telecom Transport Management, Inc
Trempealeau, County of
Tri-County Electric Cooperative

USCOC OF WISCONSIN RSA #6, INC.
USCOC OF WISCONSIN RSA #7, INC.
USCOC of Greater Iowa, LLC
USCOC of Lacrosse, LLC
Upper Midwest Wireless, LLC
Verizon Wireless (VAW) LLC (ND,MN,SD,NE)
Verizon Wireless VAW LLC-IA WI Grt Plns
WASHINGTON, COUNTY OF
West Wisconsin Telcom Cooperative, Inc.
Winona, County of
Wisconsin Bell Telephone Company
Wisconsin RSA No. 8 Limited Partnership
Wisconsin, State of
Wisper Wireless Solutions, LLC
Wood, County of
Xcel Energy Services, 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: 12/20/2016
Job Number: 161220COMSGE01

Administrative Information

Status ENGINEER PROPOSAL
Call Sign OAKDALE
Licensee Code ZDIRTV
Licensee Name DIRECTV Enterprises, LLC

Site Information

OAKDALE, MN

Venue Name
Latitude (NAD 83) 44° 59' 34.6" N
Longitude (NAD 83) 92° 58' 41.2" W
Climate Zone A
Rain Zone 2
Ground Elevation (AMSL) 304.99 m / 1000.6 ft

Link Information

Satellite Type Geostationary
Mode TR - Transmit-Receive
Modulation Analog
Satellite Arc 40° W to 57° West Longitude
Azimuth Range 118.1° to 134.2°
Corresponding Elevation Angles 16.9° / 27.2°
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	58.5 dBi / 9.2 m	60.1 dBi / 9.2 m	
3-dB / 15-dB Beamwidth	0.18° / 0.38°	0.16° / 0.34°	
Max Available RF Power	(dBW/4 kHz)	-7.0	
	(dBW/MHz)	17.0	
Maximum EIRP	(dBW/4 kHz)	53.1	
	(dBW/MHz)	77.1	
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 11.0 GHz

Transmit 14.0 GHz

Emission / Frequency Range (MHz)	500KF3D / 11440-11450 500KF3D / 11450-11460	1M00F2D / 13249.5 and 14490-14500
Max Great Circle Coordination Distance	266.2 km / 165.4 mi	155.5 km / 96.6 mi
Precipitation Scatter Contour Radius	504.1 km / 313.2 mi	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
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Coordination Values

OAKDALE, MN

Licensee Name	DIRECTV Enterprises, LLC		
Latitude (NAD 83)	44° 59' 34.6" N		
Longitude (NAD 83)	92° 58' 41.2" W		
Ground Elevation (AMSL)	304.99 m / 1000.6 ft		
Antenna Centerline (AGL)	5.49 m / 18.0 ft		
Antenna Model	General Dynamics 9.2 meter		
Antenna Mode	Receive 11.0 GHz		Transmit 14.0 GHz
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz 20%
	Short Term	-146.0 dBW/MHz	0.01%
Max Available RF Power		-7.0 (dBW/4 kHz)	-128.0 dBW/4 kHz 0.0025%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 14.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.44	116.83	-10.00	209.36	-10.00	114.90
5	0.58	112.09	-10.00	202.99	-10.00	106.84
10	0.65	107.33	-10.00	199.49	-10.00	103.67
15	0.41	102.52	-10.00	211.85	-10.00	117.13
20	0.41	97.74	-10.00	211.85	-10.00	117.12
25	0.34	92.94	-10.00	218.11	-10.00	122.60
30	0.44	88.15	-10.00	209.74	-10.00	115.24
35	0.61	83.35	-10.00	201.62	-10.00	105.59
40	0.30	78.57	-10.00	221.52	-10.00	125.51
45	0.00	73.82	-10.00	231.37	-10.00	132.48
50	0.00	69.06	-10.00	231.37	-10.00	132.48
55	0.00	64.32	-10.00	231.37	-10.00	132.48
60	0.00	59.60	-10.00	231.37	-10.00	132.48
65	0.00	54.90	-10.00	231.37	-10.00	132.48
70	0.00	50.25	-10.00	231.37	-10.00	132.48
75	0.00	45.65	-9.49	233.63	-9.49	133.91
80	0.00	41.12	-8.35	238.73	-8.35	137.16
85	0.24	36.59	-7.08	240.51	-7.08	137.30
90	0.00	32.40	-5.76	251.06	-5.76	145.15
95	0.00	28.31	-4.30	258.29	-4.30	150.02
100	0.00	24.53	-2.74	266.23	-2.74	155.48
105	0.35	20.96	-1.04	260.07	-1.04	147.01
110	0.39	18.31	0.43	262.94	0.43	147.49
115	0.48	16.68	1.44	260.19	1.44	143.46
120	0.59	16.40	1.63	253.76	1.63	137.51
125	0.63	17.63	0.84	247.27	0.84	133.06
130	0.61	20.08	-0.57	240.80	-0.57	129.64
135	0.58	23.01	-2.05	235.51	-2.05	128.35
140	0.55	25.77	-3.28	230.77	-3.28	125.92
145	0.45	28.40	-4.33	232.94	-4.33	128.96
150	0.34	30.82	-5.22	239.34	-5.22	134.09
155	0.32	33.46	-6.11	237.19	-6.11	133.29
160	0.33	36.53	-7.07	232.04	-7.07	130.04
165	0.32	39.95	-8.04	228.60	-8.04	129.48
170	0.55	43.49	-8.96	205.95	-8.96	110.70
175	0.24	47.52	-9.92	227.54	-9.92	130.46
180	0.33	51.50	-10.00	219.17	-10.00	123.51
185	0.29	55.65	-10.00	222.93	-10.00	126.70

COMSEARCH

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Coordination Values

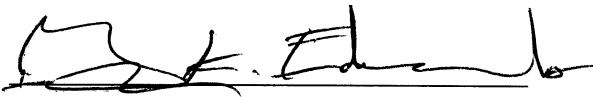
OAKDALE, MN

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Interference Objectives:	Long Term	-156.0 dBW/MHz	20%
	Short Term	-146.0 dBW/MHz	0.01%
Max Available RF Power		-7.0 (dBW/4 kHz)	-128.0 dBW/4 kHz 0.0025%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 14.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	59.96	-10.00	231.37	-10.00	132.48
195	0.28	64.17	-10.00	223.54	-10.00	127.21
200	0.00	68.57	-10.00	231.37	-10.00	132.48
205	0.00	72.95	-10.00	231.37	-10.00	132.48
210	0.00	77.36	-10.00	231.37	-10.00	132.48
215	0.00	81.78	-10.00	231.37	-10.00	132.48
220	0.00	86.22	-10.00	231.37	-10.00	132.48
225	0.00	90.67	-10.00	231.37	-10.00	132.48
230	0.00	95.12	-10.00	231.37	-10.00	132.48
235	0.00	99.56	-10.00	231.37	-10.00	132.48
240	0.00	103.98	-10.00	231.37	-10.00	132.48
245	0.00	108.38	-10.00	231.37	-10.00	132.48
250	0.00	112.74	-10.00	231.37	-10.00	132.48
255	0.28	117.13	-10.00	223.40	-10.00	127.09
260	0.33	121.42	-10.00	219.30	-10.00	123.61
265	0.00	125.50	-10.00	231.37	-10.00	132.48
270	0.54	129.82	-10.00	204.97	-10.00	108.67
275	0.47	133.77	-10.00	207.30	-10.00	113.03
280	0.39	137.55	-10.00	213.72	-10.00	118.77
285	0.31	141.11	-10.00	220.85	-10.00	124.94
290	0.00	144.21	-10.00	231.37	-10.00	132.48
295	0.00	147.13	-10.00	231.37	-10.00	132.48
300	0.00	149.57	-10.00	231.37	-10.00	132.48
305	0.00	151.41	-10.00	231.37	-10.00	132.48
310	0.00	152.52	-10.00	231.37	-10.00	132.48
315	0.00	152.81	-10.00	231.37	-10.00	132.48
320	0.00	152.26	-10.00	231.37	-10.00	132.48
325	0.00	148.55	-10.00	231.37	-10.00	132.48
330	0.00	144.30	-10.00	231.37	-10.00	132.48
335	0.20	139.97	-10.00	231.10	-10.00	132.25
340	0.00	135.39	-10.00	231.37	-10.00	132.48
345	0.50	130.93	-10.00	204.85	-10.00	110.77
350	0.71	126.31	-10.00	196.60	-10.00	101.13
355	0.65	121.59	-10.00	199.42	-10.00	103.61

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 03, 2017