

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Kratos/RT Logic
COLORADO SPRINGS, CO
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
February 15, 2018

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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 and frequency offsets 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 01/09/2018.

Company

3G Wireless, LLC
AC BidCO LLC
AERIAL VIDEO SYSTEMS
AirLife Denver
Alascom Inc
Arapahoe, County of
Arvada Police Dept.
Ascent Media Network Services, LLC
AT&T Mobility Spectrum LLC - CO
Bellsouth Telecommunications, Inc.
Black Hawk Police Department
Black Hills Power and Light
BNSF Railway Company
Borgeson, Tom R.
Boulder, County of
Broadcast Sports Inc.
Carolina Telephone and Telegraph Co
Casper, John
CBS Communications Services Inc
CBS Television Stations
CbTV, Inc.
Cellular Inc. Network Corporation
CenturyTel of the Southwest, Inc.
Chicago Comnet Corp
Cincinnati Bell Wireless LLC
City of Aurora
City of Colorado Springs
City of Lakewood, CO
Citywide News Network, Inc.
Cohen, Elena
Colorado Interstate Gas Company
Colorado Public TV - KBDI
Colorado Rockies Baseball Club
Colorado Springs Utilities
County of Clear Creek
County of Pueblo
Cowboys Stadium LP
DCI II, INC.
Denver, City and County of
Direct Broadcast Services, Inc.
Directlink, LLC

DIRECTV SPORTS NET ROCKY MNT, LLC
Douglas County Sheriff's Office
Eagle-Net Alliance
Elbert County Communications Authority
Entravision Holdings, LLC
Fones West Digital Systems Inc.
Frontier California Inc.
Gilpin County Sheriff's Office
Global Telecom & Technology Americas, In
Goodyear Tire & Rubber Company
Gray Television Licensee, LLC
Grazi Communications, LLC
Hallco Unlimited, Inc.
Hawaiian Telcom, Inc.
Heiden, William
HF Enterprises, Inc
Illinois Bell Telephone Company
Indiana Bell Telephone Company
Industrial Tower and Wireless, LLC
Information & Display Systems, Inc.
Information Super Station, LLC
Intermountain Rural Electric Association
International Communications Group, Inc.
Ion Media Denver License, Inc.
Jefferson, County of
Kellin Communications
Kentucky RSA #3 Cellular General Partner
Kentucky RSA #4 Cellular General Partner
KRCA License LLC
KSE Radio Ventures, LLC
KWGN, LLC
Live Wire Networks, Inc.
LP Broadband, Inc.
MERCURY COMMUNICATIONS
MHO Networks
Michigan Bell Telephone Company
Moreen, Steven K
Mountain Broadband LLC
Mountain View Electric Association, Inc.
Multimedia Holdings Corporation
Navajo Communications Company
NBC Telemundo License LLC
NE Colorado Cellular, Inc.
New Cingular Wireless PCS LLC -Colorado
NEW ENGLAND DIGITAL DISTRIBUTION, INC.
NEW ENGLAND SATELLITE SYSTEMS INC
NorthWest Suburbs Community Access Corp
NSM Surveillance
Ohio Bell GTelephone Company
Olympic Wireless, LLC
Onboard Images
Pacific Bell Tel Com dba AT&T California
Penn Service Microwave Co., Inc.
Pepsi Center
Pikes Peak Television, Inc.
Plateau Telecommunications, Inc.

Plum TV, LLC
Production & Satellite Services, Inc.
Questar Infocomm, Inc.
Quick Link Connections Inc.
Qwest Corporation
Qwest Corporation
Radiofone, Inc.
Randy Hermes Production
RCC Minnesota Inc. - MN NE ND SD
Remote Broadcasts, Inc.
REMOTE FACILITIES CONSULTING SERVICES
RF Central, LLC
RF Film, Inc
Rocky Mountain Public Broadcasting Netwo
Sangre De Cristo Communications, LLC
SBE Coordinator
Scripps Media, Inc. - KMGH TV
Southwestern Bell Telephone L.P.
Spanish Television of Denver, Inc.
Speedshotz, Inc
Sprint Communications Company, LP
Sprint Spectrum L.P.
Sprint Spectrum LP DBA Sprint PCS
State of Colorado
Tallgrass Operations, LLC
Texas Telecommunications, LP
T-Mobile License LLC
Tribune Broadcasting Denver License, LLC
Trinity Christian Center of Santa Ana
Tri-State Generation & Transmission Assn
TTWN Networks, LLC
Union Pacific Railroad Company
Unisat, Inc.
United Telephone - Southeast
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 -CO/ID/MT/WY
Village Video Productions Inc
Vyvx, LLC
Westar Satellite Services LP
Western Technical Services
Westminster City Colorado
Wexler Video, Inc.
Winged Vision Inc
Wisconsin Bell Telephone Company
Wolfe Air Aviation
Word of God Fellowship, Inc.
WWC Holding Co., Inc. - Mountain Region

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: 02/13/2018
Job Number: 180109COMSGE01

Administrative Information

Status: ENGINEER PROPOSAL
Call Sign:
Licensee Code: KRATOS
Licensee Name: Kratos/RT Logic

Site Information

COLORADO SPRINGS, CO
Venue Name:
Latitude (NAD 83): 39° 0' 45.9" N
Longitude (NAD 83): 104° 49' 19.3" W
Climate Zone: A
Rain Zone: 2
Ground Elevation (AMSL): 2032.23 m / 6667.4 ft

Link Information

Satellite Type: Geostationary
Mode: TR - Transmit-Receive
Modulation: Digital
Satellite Arc: 34° W to 177° West Longitude
Azimuth Range: 102.4° to 258.6°
Corresponding Elevation Angles: 6.1° / 5.1°
Antenna Centerline (AGL): 2.74 m / 9.0 ft

Antenna Information

		Receive - FCC32		Transmit - FCC32	
Manufacturer		Patriot		Patriot	
Model		1.8 meter		1.8 meter	
Gain / Diameter		35.6 dBi / 1.8 m		39.6 dBi / 1.8 m	
3-dB / 15-dB Beamwidth		1.00° / 1.80°		0.80° / 1.50°	
Max Available RF Power	(dBW/4 kHz) (dBW/MHz)			-11.2 12.8	
Maximum EIRP	(dBW/4 kHz) (dBW/MHz)			28.4 52.4	
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)	N0N - 5M00G7W / 3700.0 - 4200.0	N0N - 5M00G7W / 5925 - 5929, 6110 - 6136, 6169 - 6181, 6214 - 6240, 6288 - 6329, 6451 - 6582, 6590 - 6718, 6752 - 6758, 6772 - 6778, 6792 - 6818, 6832 - 6873, 6902 - 6948, 7002 - 7048
Max Great Circle Coordination Distance	489.4 km / 304.0 mi	214.9 km / 133.5 mi
Precipitation Scatter Contour Radius	618.0 km / 383.9 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

COLORADO SPG, CO

Licensee Name Kratos/RT Logic
Latitude (NAD 83) 39° 0' 45.9" N
Longitude (NAD 83) 104° 49' 19.3" W
Ground Elevation (AMSL) 2032.23 m / 6667.4 ft
Antenna Centerline (AGL) 2.74 m / 9.0 ft
Antenna Model Patriot 1.8 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 -11.2 (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	1.74	101.42	-10.00	201.57	-10.00	100.00
5	1.82	97.33	-10.00	199.27	-10.00	100.00
10	2.03	92.35	-10.00	193.80	-10.00	100.00
15	2.45	87.36	-10.00	184.31	-10.00	100.00
20	2.36	82.37	-10.00	186.38	-10.00	100.00
25	2.24	77.38	-10.00	189.03	-10.00	100.00
30	2.28	72.39	-10.00	188.02	-10.00	100.00
35	2.24	67.41	-10.00	188.97	-10.00	100.00
40	2.29	62.42	-10.00	187.82	-10.00	100.00
45	2.40	57.43	-10.00	185.31	-10.00	100.00
50	2.41	52.45	-10.00	185.14	-10.00	100.00
55	2.01	47.49	-9.91	194.68	-9.91	100.00
60	1.86	42.53	-8.72	204.22	-8.72	100.00
65	1.92	37.55	-7.37	206.35	-7.37	100.00
70	1.80	32.61	-5.83	217.25	-5.83	100.00
75	2.23	27.61	-4.03	215.66	-4.03	100.00
80	2.29	22.66	-1.88	225.98	-1.88	100.00
85	1.80	17.87	0.70	256.85	0.70	103.77
90	1.80	13.08	4.08	281.91	4.08	114.82
95	1.89	8.48	8.78	317.96	8.78	129.19
100	1.86	4.89	14.78	452.70	14.78	196.58
105	1.65	5.21	14.08	387.16	14.08	159.68
110	1.37	8.90	8.27	334.10	8.27	138.99
115	1.19	12.72	4.39	307.97	4.39	131.10
120	1.27	16.30	1.70	283.74	1.70	120.26
125	0.79	20.18	-0.62	291.47	-0.62	129.59
130	0.77	23.64	-2.34	280.41	-2.34	125.25
135	0.52	27.12	-3.83	287.88	-3.83	132.66
140	0.50	30.28	-5.03	280.95	-5.03	130.01
145	0.36	33.33	-6.07	291.28	-6.07	137.34
150	0.00	36.32	-7.00	305.06	-7.00	148.91
155	0.00	38.75	-7.71	300.29	-7.71	146.60
160	0.00	40.84	-8.28	296.48	-8.28	144.76
165	0.00	42.54	-8.72	293.56	-8.72	143.37
170	0.00	43.79	-9.04	291.49	-9.04	142.39
175	0.00	44.57	-9.23	290.25	-9.23	141.80
180	0.00	44.83	-9.29	289.84	-9.29	141.61
185	0.00	44.57	-9.23	290.25	-9.23	141.80

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Coordination Values

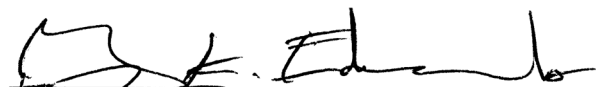
COLORADO SPG, CO

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Longitude (NAD 83)	104° 49' 19.3" W			
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Antenna Model	Patriot 1.8 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			-11.2 (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	0.00	43.80	-9.04	291.48	-9.04	142.38
195	0.00	42.54	-8.72	293.56	-8.72	143.37
200	0.00	40.84	-8.28	296.48	-8.28	144.77
205	0.28	38.51	-7.64	290.03	-7.64	139.05
210	0.69	35.77	-6.84	256.76	-6.84	116.23
215	0.72	33.05	-5.98	259.61	-5.98	116.92
220	0.80	30.06	-4.95	261.50	-4.95	116.62
225	0.96	26.80	-3.70	259.14	-3.70	112.96
230	1.44	23.16	-2.12	250.88	-2.12	104.47
235	1.26	19.85	-0.45	268.64	-0.45	114.04
240	1.92	15.86	1.99	261.92	1.99	104.89
245	3.41	11.23	5.74	247.65	5.74	100.00
250	3.74	7.33	10.38	274.73	10.38	100.06
255	4.34	3.19	19.41	371.51	19.41	145.07
260	4.35	1.62	26.73	489.35	26.73	214.86
265	3.77	6.58	11.55	283.27	11.55	104.07
270	4.14	11.48	5.50	228.85	5.50	100.00
275	2.47	16.65	1.47	242.34	1.47	100.00
280	2.46	21.60	-1.36	224.82	-1.36	100.00
285	2.06	26.60	-3.62	221.93	-3.62	100.00
290	1.47	31.63	-5.50	229.39	-5.50	100.00
295	1.44	36.60	-7.09	221.45	-7.09	100.00
300	1.04	41.61	-8.48	227.04	-8.48	100.00
305	1.22	46.57	-9.70	214.93	-9.70	100.00
310	0.99	51.56	-10.00	220.90	-10.00	100.00
315	0.79	56.55	-10.00	231.84	-10.00	102.84
320	0.78	61.53	-10.00	232.35	-10.00	103.24
325	0.42	66.53	-10.00	258.54	-10.00	122.37
330	0.52	71.50	-10.00	248.50	-10.00	115.31
335	0.71	76.48	-10.00	236.77	-10.00	106.62
340	0.83	81.47	-10.00	229.61	-10.00	101.10
345	0.96	86.45	-10.00	222.68	-10.00	100.00
350	1.20	91.44	-10.00	214.28	-10.00	100.00
355	1.35	96.43	-10.00	209.72	-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.

BY: 

Gary K. Edwards
Senior Manager
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147

DATED: February 15, 2018