

# 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  
August 25, 2016

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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

Qwest Corporation  
Kellin Communications  
T-Mobile License LLC  
New Cingular Wireless PCS LLC -Colorado

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 with a letter dated 08/24/2016.

Company

52 Eighty, LLC  
AIRCELL, LLC - GOGO, LLC  
ARVADA, CITY OF  
AT&T Mobility Spectrum LLC - CO  
Adams County IT Department  
Adcom 911  
Anadarko Petroleum Corporation  
Arvada Police Dept.  
Black Hawk Police Department  
Blanca Telephone Company  
Blue Ocean Enterprises, Inc.  
Boulder, County of  
Brainstorm Internet  
CBS Communication Services Inc  
CITY OF ARVADA, WATER T&D DIVISION  
Castle Rock, Town of  
Cellular Inc. Network Corporation  
Cellular, Inc. Financial Corporation  
Centennial Water & Sanitation District  
CenturyTel Broadband Services  
CenturyTel of Eagle, Inc.  
Chaffee County Telecom, LLC  
City and County of Broomfield  
City and County of Denver - (DIA)  
City of Aurora  
City of Aurora, Water Department  
City of Boulder  
City of Boulder  
City of Colorado Springs  
City of Lakewood, CO  
City of Westminster - Public Works  
City of Westminster Dept Info Technology  
Clearwire Spectrum Holdings III, LLC  
Colorado 7-Saguache Limited Partnership  
Colorado Cab Company  
Colorado RSA No. 3 Limited Partnership  
Combined Regional Communications Auth  
Commnet Four Corners, LLC  
County of Clear Creek  
County of Pueblo

DENVER, CITY AND COUNTY OF  
DPE, LLC  
Directlink, LLC  
Diverse Datum, Inc.  
Douglas County Sheriff's Office  
Eagle-Net Alliance  
Eastern Colorado Independent Networks  
El Paso County Information Technologies  
El Paso County Sheriffs Office  
Elbert County Communications Authority  
Elbert County School District C-1  
Elevations Ethernet LLC  
Elk Creek Fire Protection District  
Entravision Holdings, LLC  
FONES WEST DIGITAL SYSTEMS INC.  
Fundamental Holdings, Corp.  
Gilpin County Sheriff's Office  
Gogo LLC  
Grand County Internet Services Inc.  
Harris Corporation (Virginia)  
Intermountain Rural Electric Association  
Internet Colorado LLC  
Jade Communications, LLC  
Jefferson, County of  
KLZ RADIO, INC.  
Kellin Communications  
LP Broadband, Inc.  
Live Wire Networks, Inc.  
MHO Networks  
Montrose, County of  
Mountain Broadband LLC  
Mountain Broadband Network & Communicati  
Mountain Parks Electric Inc.  
NE Colorado Cellular, Inc.  
New Cingular Wireless PCS LLC -Colorado  
New Cingular Wireless PCS, LLC - NM  
Nex-Tech Wireless, LLC  
Northern Colorado Radio Communications  
Nucla Naturita Telephone Company  
Olympic Wireless, LLC  
PCI BROADBAND  
PDC Energy  
Parker Fire Protection District  
Pitkin County  
Pitkin, County of  
Platte River Power Authority  
Pueblo, City of  
Qwest Corporation  
RED ROCKS DATA CENTER  
Rae Nelson Group, LLC  
ResortNet, LLC  
Rockland Corporation  
Rocky Mountain Public Broadcasting Netwo  
Roggen Telephone Enterprises, Inc.  
Royces Electronics Inc  
SALEM MEDIA OF COLORADO, INC

SUMMIT, COUNTY OF  
San Isabel Cellular Of Colorado L.P.  
San Isabel Electric Association, Inc  
SkyWerx Industries, LLC  
South Park, LLC  
Sprint Communications Company, LP  
Sprint Spectrum L.P.  
Sprint Spectrum LP DBA Sprint PCS  
Sprintcom, Inc  
State of Colorado  
T-Mobile License LLC  
TXWI NET LLC  
Taosnet LLC  
Teller County  
Telos Online  
Telstar Communications, Inc  
Thompson School District R2-J  
Tri-State Generation & Transmission Assn  
Tribune Broadcasting Denver License, LLC  
Union Pacific Railroad Company  
Union Telephone Company, Inc.  
United Wireless Communications, Inc.  
University Corp for Atmospheric Research  
University of Colorado Health  
University of Colorado at Boulder Police  
Verizon Wireless (VAW) LLC -CO/ID/MT/WY  
Verizon Wireless(VAW) LLC-AZ/CO/NM/NV/UT  
Vision Wireless Communication  
Weld County  
West Metro Fire Protection District  
Wheatland Electric Cooperative, Inc  
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: 08/25/2016  
Job Number: 160824COMSGE08

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### Administrative Information

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

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### 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

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### 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

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### Antenna Information

Manufacturer GD Satcom  
Model 1184  
Gain / Diameter 45.0 dBi / 1.8 m  
3-dB / 15-dB Beamwidth 1.00° / 1.80°

### Receive - FCC32

GD Satcom  
1184  
45.0 dBi / 1.8 m  
1.00° / 1.80°

### Transmit - FCC32

GD Satcom  
1184  
46.5 dBi / 1.8 m  
0.80° / 1.50°

Max Available RF Power (dBW/4 kHz) -14.0  
(dBW/MHz) 10.0

Maximum EIRP (dBW/4 kHz) 32.5  
(dBW/MHz) 56.5

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%

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### Frequency Information

Emission / Frequency Range (MHz)  
NON - 5M00G7W / 10950.0 - 11200.0  
NON - 5M00G7W / 11450.0 - 12200.0

### Receive 11.0 GHz

NON - 5M00G7W / 10950.0 - 11200.0  
NON - 5M00G7W / 11450.0 - 12200.0

### Transmit 14.0 GHz

NON - 5M00G7W / 14000.0 - 14500.0

Max Great Circle Coordination Distance 473.6 km / 294.2 mi 202.6 km / 125.9 mi  
Precipitation Scatter Contour Radius 606.5 km / 376.8 mi 100.0 km / 62.1 mi

# COMSEARCH

## Earth Station Data Sheet

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### Coordination Values

### COLORADO SPRINGS, 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 GD Satcom 1.8 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% -128.0 dBW/4 kHz 0.0025%  
Max Available RF Power -14.0 (dBW/4 kHz)

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	1.74	101.42	-10.00	154.39	-10.00	100.00
5	1.82	97.33	-10.00	151.76	-10.00	100.00
10	2.03	92.35	-10.00	145.83	-10.00	100.00
15	2.45	87.36	-10.00	136.58	-10.00	100.00
20	2.36	82.37	-10.00	138.49	-10.00	100.00
25	2.24	77.38	-10.00	141.02	-10.00	100.00
30	2.28	72.39	-10.00	140.04	-10.00	100.00
35	2.24	67.41	-10.00	140.96	-10.00	100.00
40	2.29	62.42	-10.00	139.85	-10.00	100.00
45	2.40	57.43	-10.00	137.50	-10.00	100.00
50	2.41	52.45	-10.00	137.34	-10.00	100.00
55	2.01	47.49	-9.91	146.72	-9.91	100.00
60	1.86	42.53	-8.72	156.96	-8.72	100.00
65	1.92	37.55	-7.37	161.85	-7.37	100.00
70	1.80	32.61	-5.83	176.50	-5.83	100.00
75	2.23	27.61	-4.03	174.01	-4.03	100.00
80	2.29	22.66	-1.88	183.62	-1.88	100.00
85	1.80	17.87	0.70	204.70	0.70	100.00
90	1.80	13.08	4.08	220.60	4.08	100.00
95	1.89	8.48	8.78	243.12	8.78	100.00
100	1.86	4.89	14.78	429.63	14.78	180.67
105	1.65	5.21	14.08	332.79	14.08	134.29
110	1.37	8.90	8.27	256.17	8.27	110.15
115	1.19	12.72	4.39	239.84	4.39	103.51
120	1.27	16.30	1.70	223.68	1.70	100.00
125	0.79	20.18	-0.62	231.01	-0.62	103.69
130	0.77	23.64	-2.34	223.72	-2.34	100.06
135	0.52	27.12	-3.83	230.06	-3.83	107.49
140	0.50	30.28	-5.03	225.42	-5.03	105.23
145	0.36	33.33	-6.07	233.82	-6.07	113.44
150	0.00	36.32	-7.00	245.11	-7.00	123.33
155	0.00	38.75	-7.71	241.70	-7.71	121.55
160	0.00	40.84	-8.28	239.07	-8.28	120.11
165	0.00	42.54	-8.72	237.06	-8.72	119.00
170	0.00	43.79	-9.04	235.63	-9.04	118.21
175	0.00	44.57	-9.23	234.78	-9.23	117.73
180	0.00	44.83	-9.29	234.50	-9.29	117.57
185	0.00	44.57	-9.23	234.78	-9.23	117.73

# COMSEARCH

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19700 Janelia Farm Boulevard, Ashburn, VA 20147  
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### Coordination Values

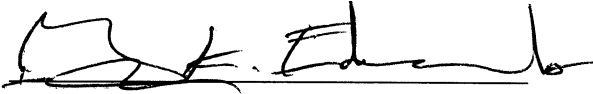
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Antenna Mode	Receive 11.0 GHz		Transmit 14.0 GHz	
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz	20%
Short Term	-146.0 dBW/MHz	0.01%	-128.0 dBW/4 kHz	0.0025%
Max Available RF Power			-14.0 (dBW/4 kHz)	

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	43.80	-9.04	235.63	-9.04	118.21
195	0.00	42.54	-8.72	237.06	-8.72	119.00
200	0.00	40.84	-8.28	239.07	-8.28	120.11
205	0.28	38.51	-7.64	233.72	-7.64	115.18
210	0.69	35.77	-6.84	208.18	-6.84	100.00
215	0.72	33.05	-5.98	209.91	-5.98	100.00
220	0.80	30.06	-4.95	210.86	-4.95	100.00
225	0.96	26.80	-3.70	208.60	-3.70	100.00
230	1.44	23.16	-2.12	204.36	-2.12	100.00
235	1.26	19.85	-0.45	213.95	-0.45	100.00
240	1.92	15.86	1.99	207.51	1.99	100.00
245	3.41	11.23	5.74	196.80	5.74	100.00
250	3.74	7.33	10.38	210.92	10.38	100.00
255	4.34	3.19	19.41	323.20	19.41	124.58
260	4.35	1.62	26.73	473.56	26.73	202.60
265	3.77	6.58	11.55	216.59	11.55	100.00
270	4.14	11.48	5.50	180.64	5.50	100.00
275	2.47	16.65	1.47	195.76	1.47	100.00
280	2.46	21.60	-1.36	182.18	-1.36	100.00
285	2.06	26.60	-3.62	180.41	-3.62	100.00
290	1.47	31.63	-5.50	188.34	-5.50	100.00
295	1.44	36.60	-7.09	181.41	-7.09	100.00
300	1.04	41.61	-8.48	187.46	-8.48	100.00
305	1.22	46.57	-9.70	175.75	-9.70	100.00
310	0.99	51.56	-10.00	182.18	-10.00	100.00
315	0.79	56.55	-10.00	192.51	-10.00	100.00
320	0.78	61.53	-10.00	192.95	-10.00	100.00
325	0.42	66.53	-10.00	210.94	-10.00	100.00
330	0.52	71.50	-10.00	203.53	-10.00	100.00
335	0.71	76.48	-10.00	196.73	-10.00	100.00
340	0.83	81.47	-10.00	190.51	-10.00	100.00
345	0.96	86.45	-10.00	183.96	-10.00	100.00
350	1.20	91.44	-10.00	175.17	-10.00	100.00
355	1.35	96.43	-10.00	169.94	-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: August 25, 2016