

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Harte Satellite Consultants
TACOMA, WA
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
August 26, 2021

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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 05/12/2021.

10Band LLC
3G Wireless, LLC
AC BidCO LLC
Accel Net, Inc.
Advanced Internet
Aerial Video Systems
Agreserves, Inc
AgriNorthwest
Air Speed Internet, LLC
Alascom Inc
All Classical Public Media, Inc
Alyrica Networks, Inc
Ascent Media Network Services, LLC
Astoria 911
Astound Broadband, LLC
AT&T Mobility Spectrum LLC - Washington
AT&T Mobility Wireless Ops Hldgs - WA
AT&T Mobility Wireless Ops Hldgs Inc -OR
AT&T Wireless Services 3 LLC - OR
Atlas Networks Corporation
Avista Corporation
Azure Standard
Bain, Robert B
Bearclaw, LLC
Bellingham, City of
Bellsouth Telecommunications, Inc.
Benton County Emergency Services
Benton Rural Electric Association
Blue Mountain Networks LLC
BNSF Railway Company
Boeing Company
Bookbinder, LLC
Borgeson, Tom R.
Brigadier, LLC
Broadcast Sports Inc.
Carolina Telephone and Telegraph Co
Cascade Natural Gas Corporation
Cascade Public Media
Casper, John
Cellco Partnership - Oregon
Cellco Partnership - Washington

Cencom - Kitsap 911
Central Connect
Central Lincoln Peoples Utility District
CenturyTel of Inter Island, Inc.
CenturyTel of the Southwest, Inc.
CenturyTel of Washington, Inc.
Chelan County PUD #1
Chicago Comnet Corp
Christ Loves You Broadcasting
Cincinnati Bell Wireless LLC
City of Astoria
City of Portland
City of Prineville
City of Seaside
City of Tacoma / Tacoma Public Utilities
Citywide News Network, Inc.
Clackamas C800 Radio Group
Clackamas River Water District
Clackamas, County of
Clark Public Utilities
Clark, County of WA (Emergency Services)
Clearwire Spectrum Holdings II, LLC
Clearwire Spectrum Holdings III, LLC
Clearwire Spectrum Holdings LLC
Columbia 911 Communications District
Columbia Rural Electric Association, Inc
Community Transit Snohomish County PTBA
Computer 5, Inc.
Consolidated Comm of Washington Company
Consumers Power Inc.
Cowboys Stadium LP
Cowlitz County 911
Cowlitz County Fire District #5
Cowlitz, County of
Cyberdyne Networks, Inc.
Darrington Internet Users Association
Day Management Corporation
DCI II, INC.
Deschutes County 911
Desert Winds Wireless
Direct Broadcast Services, Inc.
Eastern Oregon Telecom LLC
Eastside Public Safety Com Agency
Electron Hydro LLC
Elevate Technology Group
Entercom License, LLC
Everett MSO, Inc
Everett MSO, Inc.
Fox Television Stations, LLC
Franklin County Sheriff
Freewire Broadband LLC
Frontier California Inc.
Frontier Communications Northwest Inc.
Frontier Telenet
Gigabeam Internet
Global Data Link, Inc

Global Telecom & Technology Americas, In
Gorge Networks
Hallco Unlimited, Inc.
Hawaiian Telecom Inc.
Haystack Broadcasting Inc
Heiden, William
Helix Telephone Company
Hermiston, City of
HF Enterprises, Inc
Hispanavision, LLC
Illinois Bell Telephone Company
Indiana Bell Telephone Company
Infinity Internet
Information & Display Systems, Inc.
Information Super Station, LLC
Inland Cellular LLC
International Communications Group, Inc.
Johnco PTP LLC
JSH Farms, Inc
Kentucky RSA #3 Cellular General Partner
Kentucky RSA #4 Cellular General Partner
KGY, Inc.
King Broadcasting Company
King Broadcasting Company - KTVB TV
King County DOT Metro Transit Division
King, County of
KIRO-TV, Inc
Lightspeed Networks, Inc.
M2 Mach Media, LLC
Makah Tribe
Marion County Public Works
Maritime Fire & Safety Association
Mason County PUD No 3
McDaniel Cellular Telephone Company
MCI Communications Services Inc.
McMinnville Access Company
Meesa Corp
MERCURY COMMUNICATIONS
Meritel Group, Inc.
Metcom 911
Michigan Bell Telephone Company
Microsoft Corp
Moreen, Steven K
Mosier WiNet, LLC
Mt. Baker Cable
Navajo Communications Company
New Cingular Wireless PCS LLC -OR Region
New Cingular Wireless PCS LLC-Washington
NEW ENGLAND DIGITAL DISTRIBUTION, INC.
Nikola Engineering, Inc.
Noel Communications, Inc.
North Central ESD
Northwest Open Access Network
Northwest Pipeline GP
NorthWest Suburbs Community Access Corp
NSM Surveillance

NW Natural Gas Company
Ohio Bell GTelephone Company
Olympic Wireless, LLC
Onboard Images
Orcas Power And Light Cooperative
Oregon RSA #2, Inc.
Oregon State
Oregon State (Osp)
Oregon State University
Oregon, State of (ODOT)
Pacific Bell Tel Com dba AT&T California
Pacific Public Media
Pacific, County of
PacifiCorp
Peak Internet
Penn Service Microwave Co., Inc.
Pick Two LLC
Pierce County
Pierce Transit
Plateau Telecommunications, Inc.
Plum TV, LLC
PocketiNet Communications Inc.
Polk County Sheriffs Office
Port of Portland
Portland General Electric
Prinetime Internet Solutions, LLC
Production & Satellite Services, Inc.
Public Util Dist. #1 of Snohomish County
Public Utility Dist #2 of Pacific County
Public Utility Dist 1 of Cowlitz County
PUD #1 of Clallam County
Puget Sound Educational TV, Inc.
Puget Sound Energy, Inc
Quick Link Connections Inc.
Quicktel Internet
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
Richesin, Joshua L
Rivercom 911
Rock Island Technology Solutions
Saddle Mountain Wireless Inc.
San Juan Cable, Inc
Sawtooth Technologies, LLC
Seattle City Light
Seattle FCC License Sub, LLC
Seattle SMSA Limited Partnership
Seattle, City of
Seattle's Best Internet, LLC
Silke Communications, Inc.
Sinclair Radio of Seattle Licensee, LLC

Sinclair Seattle Licensee, LLC
 Skagit 911
 Skotdal Brothers LLC (c/o CSI)
 SmartSky Microwave, LLC
 Snohomish County Emergency Radio System
 Sound Internet Services, Inc.
 Southwestern Bell Telephone L.P.
 Spectrum Communications Inc
 Spectrum Networks Inc. - T
 Speedshotz, Inc
 Sprint Spectrum LLC
 Sprintcom, Inc
 St. Anthony Hospital
 Startouch, Inc.
 Stayton Cooperative Telephone Company
 Stephouse Holdings Company, LLC
 Stephouse Networks
 Sunheaven Farms, LLC
 Symplified Technologies, LLC
 TDS Baja Broadband LLC
 TDS Broadband Service LLC
 Thurston 9-1-1 Communications
 Tillamook County Emergency Communication
 T-Mobile Lic LLC - Voicestream PCS BTA I
 T-Mobile License LLC
 Towerstream Corp.
 Tri County Metro Transit Dist of Oregon
 TTWN Networks, LLC
 Umatilla Morrow ESD
 Umatilla Morrow Radio & Data District
 Union Pacific Railroad Company
 Unisat, Inc.
 United Telephone - Southeast
 United Telephone Co. of the Northwest
 UnwiredWest, LLC
 USCOC of Washington 4 Inc.
 USCOC of Richland, 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.
 VYVX, LLC
 Warden Hutterian Brethren Inc
 Warm Springs Telecommunications Company
 Washington Broadband, Inc.
 Washington County Consolidated Comm Agnc
 Washington State Dept of Natural Resourc
 Washington State of Dept of Transportat
 Washington, State of
 Webformix Company

Westar Satellite Services LP
Western Sub-RSA LTD Partnership
Whatcom County Sheriff's Office
Whiz to Coho, Inc.
Wholesail Networks LLC
Wiline Spectrum Holdings LLC
Winged Vision Inc
Wisconsin Bell Telephone Company
Wiztronics, Inc.
Wolfe Air Aviation
Wtechlink Inc
Yakima City Washington
Yakima County Fire District # 5
Yakima MSA Limited Partnership
Yamhill County Sheriff's Office
Yellowknife Wireless Company, LLC

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: 05/12/2021
Job Number: 210512COMSGE05

Administrative Information

Status: ENGINEER PROPOSAL
Call Sign:
Licensee Code: HARSAT
Licensee Name: Harte Satellite Consultants

Site Information

TACOMA, WA

Venue Name:
Latitude (NAD 83): 47° 10' 52.7" N
Longitude (NAD 83): 122° 26' 34.4" W
Climate Zone: B
Rain Zone: 3
Ground Elevation (AMSL): 113.96 m / 373.9 ft

Link Information

Satellite Type: Geostationary
Mode: TR - Transmit-Receive
Modulation: Digital
Satellite Arc: 53° W to 191° West Longitude
Azimuth Range: 105.4° to 253.9°
Corresponding Elevation Angles: 5.1° / 5.7°
Antenna Centerline (AGL): 1.49 m / 4.9 ft

Antenna Information

Receive - FCC32

Transmit - FCC32

Manufacturer	TTI	TTI
Model	27E01-1000-A	27E01-1000-A
Gain / Diameter	30.1 dBi / 0.45 m	30.6 dBi / 0.45 m
3-dB / 15-dB Beamwidth	4.40° / 9.00°	3.9° / 7.6°
Max Available RF Power (dBW/4 kHz)	-20.1	-20.1
(dBW/MHz)	3.9	3.9
Maximum EIRP (dBW/4 kHz)	10.5	10.5
(dBW/MHz)	34.5	34.5
Interference Objectives:	Long Term	-156.0 dBW/MHz 20%
	Short Term	-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)	25M0G7W / 10700.0 - 10950.0 25M0G7W / 11200.0 - 11450.0	7M00G7W / 12750.0 - 13250.0
Max Great Circle Coordination Distance	577.9 km / 359.0 mi	197.7 km / 122.8 mi
Precipitation Scatter Contour Radius	421.0 km / 261.6 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

TACOMA, WA

Licensee Name	Harte Satellite Consultants				
Latitude (NAD 83)	47° 10' 52.7" N				
Longitude (NAD 83)	122° 26' 34.4" W				
Ground Elevation (AMSL)	113.96 m / 373.9 ft				
Antenna Centerline (AGL)	1.49 m / 4.9 ft				
Antenna Model	TTI 0.45 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			-20.1 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 13.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.67	105.34	-10.00	228.45	-10.00	100.00
5	0.95	100.35	-10.00	198.20	-10.00	100.00
10	1.01	95.37	-10.00	190.00	-10.00	100.00
15	1.08	90.38	-10.00	186.26	-10.00	100.00
20	1.14	85.39	-10.00	183.21	-10.00	100.00
25	1.14	80.41	-10.00	183.21	-10.00	100.00
30	1.16	75.42	-10.00	182.21	-10.00	100.00
35	1.17	70.43	-10.00	181.63	-10.00	100.00
40	1.16	65.45	-10.00	182.41	-10.00	100.00
45	1.07	60.47	-10.00	186.68	-10.00	100.00
50	1.04	55.48	-10.00	188.32	-10.00	100.00
55	0.97	50.51	-10.00	196.46	-10.00	100.00
60	0.93	45.54	-9.46	203.36	-9.46	100.00
65	0.91	40.57	-8.20	214.05	-8.20	100.00
70	0.89	35.60	-6.79	224.98	-6.79	100.00
75	0.85	30.66	-5.16	240.07	-5.16	100.00
80	0.79	25.73	-3.26	256.25	-3.26	100.00
85	0.77	20.83	-0.97	275.44	-0.97	100.00
90	0.73	15.99	1.90	304.14	1.90	100.60
95	0.66	11.30	5.67	347.33	5.67	115.35
100	0.64	7.02	10.85	407.17	10.85	134.36
105	0.62	4.54	15.58	465.82	15.58	150.91
110	0.64	6.43	11.79	417.36	11.79	137.45
115	0.65	9.62	7.42	367.56	7.42	121.91
120	0.61	12.77	4.34	343.37	4.34	114.49
125	0.64	15.78	2.05	318.11	2.05	105.73
130	0.63	18.68	0.21	303.41	0.21	100.96
135	0.61	21.46	-1.29	293.79	-1.29	100.00
140	0.48	24.16	-2.58	302.07	-2.58	101.49
145	0.32	26.71	-3.67	333.48	-3.67	114.11
150	0.26	28.93	-4.53	339.93	-4.53	116.87
155	0.00	31.09	-5.32	349.09	-5.32	120.58
160	0.00	32.72	-5.87	343.84	-5.87	118.83
165	0.00	34.03	-6.30	339.86	-6.30	117.50
170	0.00	34.99	-6.60	337.08	-6.60	116.57
175	0.00	35.58	-6.78	335.44	-6.78	116.01
180	0.00	35.77	-6.84	334.89	-6.84	115.83
185	0.00	35.58	-6.78	335.43	-6.78	116.01

COMSEARCH

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Coordination Values

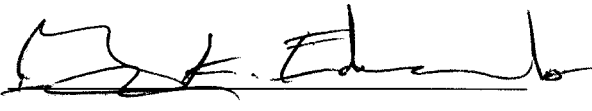
TACOMA, WA

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Antenna Model	TTI 0.45 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			-20.1 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 11.0 GHz		Transmit 13.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	34.99	-6.60	337.08	-6.60	116.57
195	0.00	34.03	-6.30	339.86	-6.30	117.50
200	0.00	32.72	-5.87	343.84	-5.87	118.83
205	0.00	31.09	-5.32	349.08	-5.32	120.58
210	0.00	29.16	-4.62	355.78	-4.62	122.79
215	0.00	26.98	-3.78	364.10	-3.78	125.52
220	0.00	24.57	-2.76	374.35	-2.76	128.85
225	0.00	21.96	-1.54	387.04	-1.54	132.94
230	0.00	19.19	-0.08	402.84	-0.08	137.96
235	0.00	16.28	1.71	422.98	1.71	144.28
240	0.00	13.24	3.95	447.54	3.95	150.77
245	0.00	10.11	6.88	485.45	6.88	163.51
250	0.00	6.94	10.96	544.63	10.96	184.44
255	0.00	5.83	12.86	577.86	12.86	197.71
260	0.00	8.34	8.97	514.81	8.97	173.76
265	0.00	12.45	4.62	455.85	4.62	153.51
270	0.00	17.04	1.21	417.28	1.21	142.50
275	0.00	21.81	-1.46	387.87	-1.46	133.20
280	0.00	26.65	-3.64	365.41	-3.64	125.95
285	0.00	31.55	-5.47	347.58	-5.47	120.08
290	0.00	36.47	-7.05	333.00	-7.05	115.19
295	0.00	41.40	-8.43	321.03	-8.43	110.79
300	0.00	46.35	-9.65	310.58	-9.65	107.21
305	0.00	51.30	-10.00	307.68	-10.00	106.21
310	0.00	56.27	-10.00	307.68	-10.00	106.21
315	0.00	61.23	-10.00	307.68	-10.00	106.21
320	0.00	66.20	-10.00	307.68	-10.00	106.21
325	0.00	71.17	-10.00	307.68	-10.00	106.21
330	0.00	76.14	-10.00	307.68	-10.00	106.21
335	0.00	81.12	-10.00	307.68	-10.00	106.21
340	0.00	86.09	-10.00	307.68	-10.00	106.21
345	0.00	91.07	-10.00	307.68	-10.00	106.21
350	0.00	96.04	-10.00	307.68	-10.00	106.21
355	0.49	101.03	-10.00	248.21	-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 26, 2021