

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Hiawatha Broadband Communications Inc.
WINONA, MN
(4.5 meter)
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
November 28, 2017

TABLE OF CONTENTS

1. CONCLUSIONS	3
2. SUMMARY OF RESULTS	4
3. SUPPLEMENTAL SHOWING	5
4. EARTH STATION COORDINATION DATA.....	6
5. CERTIFICATION.....	10

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 11/21/2017.

Company
Auracomm

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: 11/28/2017
Job Number: 171121COMSGE10

Administrative Information

Status ENGINEER PROPOSAL
Call Sign
Licensee Code HIAWAT
Licensee Name Hiawatha Broadband Communications Inc.

Site Information

WINONA, MN
Venue Name
Latitude (NAD 83) 44° 3' 16.5" N
Longitude (NAD 83) 91° 38' 14.6" W
Climate Zone A
Rain Zone 2
Ground Elevation (AMSL) 200.6 m / 658.1 ft

Link Information

Satellite Type Geostationary
Mode RO - Receive-Only
Modulation Digital
Satellite Arc 85° W to 139° West Longitude
Azimuth Range 170.5° to 237.4°
Corresponding Elevation Angles 38.8° / 21.0°
Antenna Centerline (AGL) 2.74 m / 9.0 ft

Antenna Information

Receive - FCC32
Manufacturer Patriot
Model 4.5 meter
Gain / Diameter 43.2 dBi / 4.5 m
3-dB / 15-dB Beamwidth 1.35° / 2.70°

Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Frequency Information

Receive 4.0 GHz
Emission / Frequency Range (MHz) 36M0G7W / 3700.0 - 4200.0

Max Great Circle Coordination Distance 295.7 km / 183.7 mi
Precipitation Scatter Contour Radius 501.8 km / 311.8 mi

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

WINONA, MN

Licensee Name Hiawatha Broadband Communications Inc.
Latitude (NAD 83) 44° 3' 16.5" N
Longitude (NAD 83) 91° 38' 14.6" W
Ground Elevation (AMSL) 200.6 m / 658.1 ft
Antenna Centerline (AGL) 2.74 m / 9.0 ft
Antenna Model Patriot 4.5 meter
Antenna Mode Receive 4.0 GHz
Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
0	3.39	120.93	-10.00	160.71
5	3.01	125.50	-10.00	171.33
10	3.17	130.14	-10.00	165.68
15	3.54	134.81	-10.00	157.48
20	3.53	135.30	-10.00	157.71
25	3.23	132.11	-10.00	164.36
30	3.01	128.76	-10.00	171.31
35	2.38	125.04	-10.00	185.85
40	2.21	121.44	-10.00	189.77
45	1.85	117.66	-10.00	198.52
50	1.97	113.98	-10.00	195.22
55	2.10	110.20	-10.00	192.30
60	2.16	106.33	-10.00	190.80
65	1.60	102.29	-10.00	205.44
70	1.35	98.32	-10.00	209.83
75	0.00	94.29	-10.00	285.28
80	0.00	90.39	-10.00	285.28
85	0.00	86.50	-10.00	285.28
90	0.00	82.61	-10.00	285.28
95	0.00	78.75	-10.00	285.28
100	0.00	74.92	-10.00	285.28
105	0.00	71.14	-10.00	285.28
110	0.00	67.43	-10.00	285.28
115	0.00	63.80	-10.00	285.28
120	0.00	60.28	-10.00	285.28
125	1.42	56.15	-10.00	207.86
130	1.44	52.80	-10.00	207.24
135	1.59	49.57	-10.00	205.52
140	1.55	46.68	-9.73	205.38
145	1.54	44.06	-9.10	208.58
150	1.15	42.12	-8.61	222.78
155	0.00	41.31	-8.40	295.66
160	1.47	38.56	-7.65	217.86
165	1.76	37.37	-7.31	211.11
170	1.51	37.27	-7.28	218.28
175	2.83	36.18	-6.96	190.55
180	3.25	35.97	-6.90	181.60
185	3.34	35.68	-6.81	180.09

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

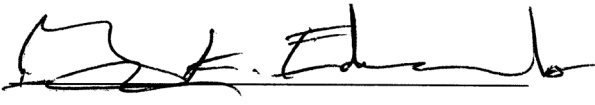
WINONA, MN

Licensee Name Hiawatha Broadband Communications Inc.
Latitude (NAD 83) 44° 3' 16.5" N
Longitude (NAD 83) 91° 38' 14.6" W
Ground Elevation (AMSL) 200.6 m / 658.1 ft
Antenna Centerline (AGL) 2.74 m / 9.0 ft
Antenna Model Patriot 4.5 meter
Antenna Mode Receive 4.0 GHz
Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
190	3.77	34.66	-6.50	172.22
195	3.25	34.18	-6.34	184.43
200	3.18	32.89	-5.93	188.02
205	3.22	31.14	-5.33	190.21
210	2.63	29.65	-4.80	205.28
215	2.60	27.36	-3.93	207.77
220	2.67	24.75	-2.84	211.73
225	2.79	21.91	-1.52	216.21
230	3.15	19.27	-0.12	215.75
235	3.13	18.04	0.60	220.51
240	2.84	18.36	0.40	226.20
245	2.46	20.01	-0.53	229.81
250	2.18	22.55	-1.83	229.09
255	1.39	26.15	-3.44	244.15
260	1.34	29.65	-4.80	237.70
265	1.42	33.42	-6.10	227.40
270	1.27	37.57	-7.37	225.44
275	1.17	41.85	-8.54	222.51
280	1.07	46.24	-9.63	219.92
285	0.21	50.95	-10.00	284.10
290	0.00	55.49	-10.00	285.28
295	0.00	60.02	-10.00	285.28
300	0.00	64.59	-10.00	285.28
305	0.00	69.19	-10.00	285.28
310	0.00	73.82	-10.00	285.28
315	0.00	78.47	-10.00	285.28
320	0.00	83.12	-10.00	285.28
325	0.00	87.79	-10.00	285.28
330	1.49	92.48	-10.00	205.82
335	1.94	97.21	-10.00	196.25
340	2.00	101.93	-10.00	194.51
345	2.38	106.68	-10.00	185.94
350	2.29	111.37	-10.00	187.80
355	3.13	116.19	-10.00	166.58

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: November 28, 2017

COMSEARCH

Earth Station Data Sheet

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

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Hiawatha Broadband Communications Inc.
WINONA, MN
(3.8 meter)
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
November 28, 2017

TABLE OF CONTENTS

1. CONCLUSIONS 3
2. SUMMARY OF RESULTS 4
3. SUPPLEMENTAL SHOWING 5
4. EARTH STATION COORDINATION DATA..... 6
5. CERTIFICATION..... 10

COMSEARCH

Earth Station Data Sheet

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

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.

COMSEARCH

Earth Station Data Sheet

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

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.

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

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 11/21/2017.

Company
Auracomm

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: 11/28/2017
Job Number: 171121COMSGE11

Administrative Information

Status ENGINEER PROPOSAL
Call Sign
Licensee Code HIAWAT
Licensee Name Hiawatha Broadband Communications Inc.

Site Information

WINONA, MN
Venue Name
Latitude (NAD 83) 44° 3' 16.5" N
Longitude (NAD 83) 91° 38' 14.6" W
Climate Zone A
Rain Zone 2
Ground Elevation (AMSL) 200.6 m / 658.1 ft

Link Information

Satellite Type Geostationary
Mode RO - Receive-Only
Modulation Digital
Satellite Arc 85° W to 139° West Longitude
Azimuth Range 170.5° to 237.4°
Corresponding Elevation Angles 38.8° / 21.0°
Antenna Centerline (AGL) 2.74 m / 9.0 ft

Antenna Information

Receive - FCC32
Manufacturer Patriot
Model 3.8 meter
Gain / Diameter 41.5 dBi / 3.8 m
3-dB / 15-dB Beamwidth 1.30° / 2.60°

Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Frequency Information

Receive 4.0 GHz
Emission / Frequency Range (MHz) 36M0G7W / 3700.0 - 4200.0

Max Great Circle Coordination Distance 295.7 km / 183.7 mi
Precipitation Scatter Contour Radius 501.8 km / 311.8 mi

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

WINONA, MN

Licensee Name Hiawatha Broadband Communications Inc.
Latitude (NAD 83) 44° 3' 16.5" N
Longitude (NAD 83) 91° 38' 14.6" W
Ground Elevation (AMSL) 200.6 m / 658.1 ft
Antenna Centerline (AGL) 2.74 m / 9.0 ft
Antenna Model Patriot 3.8 meter
Antenna Mode Receive 4.0 GHz
Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
0	3.39	120.93	-10.00	160.71
5	3.01	125.50	-10.00	171.33
10	3.17	130.14	-10.00	165.68
15	3.54	134.81	-10.00	157.48
20	3.53	135.30	-10.00	157.71
25	3.23	132.11	-10.00	164.36
30	3.01	128.76	-10.00	171.31
35	2.38	125.04	-10.00	185.85
40	2.21	121.44	-10.00	189.77
45	1.85	117.66	-10.00	198.52
50	1.97	113.98	-10.00	195.22
55	2.10	110.20	-10.00	192.30
60	2.16	106.33	-10.00	190.80
65	1.60	102.29	-10.00	205.44
70	1.35	98.32	-10.00	209.83
75	0.00	94.29	-10.00	285.28
80	0.00	90.39	-10.00	285.28
85	0.00	86.50	-10.00	285.28
90	0.00	82.61	-10.00	285.28
95	0.00	78.75	-10.00	285.28
100	0.00	74.92	-10.00	285.28
105	0.00	71.14	-10.00	285.28
110	0.00	67.43	-10.00	285.28
115	0.00	63.80	-10.00	285.28
120	0.00	60.28	-10.00	285.28
125	1.42	56.15	-10.00	207.86
130	1.44	52.80	-10.00	207.24
135	1.59	49.57	-10.00	205.52
140	1.55	46.68	-9.73	205.38
145	1.54	44.06	-9.10	208.58
150	1.15	42.12	-8.61	222.78
155	0.00	41.31	-8.40	295.66
160	1.47	38.56	-7.65	217.86
165	1.76	37.37	-7.31	211.11
170	1.51	37.27	-7.28	218.28
175	2.83	36.18	-6.96	190.55
180	3.25	35.97	-6.90	181.60
185	3.34	35.68	-6.81	180.09

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

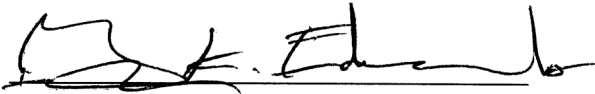
WINONA, MN

Licensee Name Hiawatha Broadband Communications Inc.
Latitude (NAD 83) 44° 3' 16.5" N
Longitude (NAD 83) 91° 38' 14.6" W
Ground Elevation (AMSL) 200.6 m / 658.1 ft
Antenna Centerline (AGL) 2.74 m / 9.0 ft
Antenna Model Patriot 3.8 meter
Antenna Mode Receive 4.0 GHz
Interference Objectives: Long Term -156.0 dBW/MHz 20%
Short Term -146.0 dBW/MHz 0.01%

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
190	3.77	34.66	-6.50	172.22
195	3.25	34.18	-6.34	184.43
200	3.18	32.89	-5.93	188.02
205	3.22	31.14	-5.33	190.21
210	2.63	29.65	-4.80	205.28
215	2.60	27.36	-3.93	207.77
220	2.67	24.75	-2.84	211.73
225	2.79	21.91	-1.52	216.21
230	3.15	19.27	-0.12	215.75
235	3.13	18.04	0.60	220.51
240	2.84	18.36	0.40	226.20
245	2.46	20.01	-0.53	229.81
250	2.18	22.55	-1.83	229.09
255	1.39	26.15	-3.44	244.15
260	1.34	29.65	-4.80	237.70
265	1.42	33.42	-6.10	227.40
270	1.27	37.57	-7.37	225.44
275	1.17	41.85	-8.54	222.51
280	1.07	46.24	-9.63	219.92
285	0.21	50.95	-10.00	284.10
290	0.00	55.49	-10.00	285.28
295	0.00	60.02	-10.00	285.28
300	0.00	64.59	-10.00	285.28
305	0.00	69.19	-10.00	285.28
310	0.00	73.82	-10.00	285.28
315	0.00	78.47	-10.00	285.28
320	0.00	83.12	-10.00	285.28
325	0.00	87.79	-10.00	285.28
330	1.49	92.48	-10.00	205.82
335	1.94	97.21	-10.00	196.25
340	2.00	101.93	-10.00	194.51
345	2.38	106.68	-10.00	185.94
350	2.29	111.37	-10.00	187.80
355	3.13	116.19	-10.00	166.58

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: November 28, 2017