

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
EchoStar Corporation
QUICKSBURG, VA
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
February 23, 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 02/09/2017.

Company

ALLEGANY COUNTY GOVERNMENT
Blaze Broadband
CONXX, Inc.
ECW Wireless, LLC
NRAO Green Bank Observatory
Rural Broadband Network Services LLC
Shenandoah Personal Communications, LLC
Telegia Communications Inc.
Virginia Cellular LLC
Virginia Everywhere, 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: 02/09/2017
Job Number: 170209COMSGE09

Administrative Information

Status: ENGINEER PROPOSAL
Call Sign: E070273
Licensee Code: ZECHOS
Licensee Name: EchoStar Corporation

Site Information

QUICKSBURG, VA

Venue Name:
Latitude (NAD 83): 38° 43' 24.6" N
Longitude (NAD 83): 78° 40' 1.4" W
Climate Zone: A
Rain Zone: 2
Ground Elevation (AMSL): 284.27 m / 932.7 ft

Link Information

Satellite Type: Geostationary
Mode: TR - Transmit-Receive
Modulation: Digital
Satellite Arc: 61° W to 148° West Longitude
Azimuth Range: 153.0° to 256.7°
Corresponding Elevation Angles: 41.5° / 7.4°
Antenna Centerline (AGL): 5.49 m / 18.0 ft

Antenna Information

Receive - FCC32

Transmit - FCC32

| | | |
|------------------------|------------------|------------------|
| Manufacturer | Vertex | Vertex |
| Model | 9 Meter | 9 Meter |
| Gain / Diameter | 58.6 dBi / 9.0 m | 62.9 dBi / 9.0 m |
| 3-dB / 15-dB Beamwidth | 0.20° / 0.40° | 0.10° / 0.30° |

| | | |
|------------------------|-------------|------|
| Max Available RF Power | (dBW/4 kHz) | -5.7 |
| | (dBW/MHz) | 18.3 |

| | | |
|--------------|-------------|------|
| Maximum EIRP | (dBW/4 kHz) | 57.2 |
| | (dBW/MHz) | 81.2 |

| | | | | | |
|--------------------------|------------|----------------|-------|------------------|---------|
| 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 12.2 GHz

Transmit 17.3 GHz

| | | |
|----------------------------------|---------------------------------------|---------------------------------------|
| Emission / Frequency Range (MHz) | 1M50G2D - 24M0M1F / 12200.0 - 12700.0 | 1M50G2D - 24M0M1F / 17300.0 - 17800.0 |
|----------------------------------|---------------------------------------|---------------------------------------|

| | | |
|--|---------------------|---------------------|
| Max Great Circle Coordination Distance | 359.5 km / 223.4 mi | 199.0 km / 123.6 mi |
| Precipitation Scatter Contour Radius | 561.4 km / 348.8 mi | 100.0 km / 62.1 mi |

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Earth Station Data Sheet

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Coordination Values

QUICKSBURG, VA

| | | | |
|--------------------------|----------------------|-------------------------|-----------------------------|
| Licensee Name | EchoStar Corporation | | |
| Latitude (NAD 83) | 38° 43' 24.6" N | | |
| Longitude (NAD 83) | 78° 40' 1.4" W | | |
| Ground Elevation (AMSL) | 284.27 m / 932.7 ft | | |
| Antenna Centerline (AGL) | 5.49 m / 18.0 ft | | |
| Antenna Model | Vertex 9 Meter | | |
| Antenna Mode | Receive 12.2 GHz | | Transmit 17.3 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 | -5.7 (dBW/4 kHz) | | |

| Azimuth (°) | Horizon Elevation (°) | Antenna Discrimination (°) | Receive 12.2 GHz | | Transmit 17.3 GHz | |
|-------------|-----------------------|----------------------------|--------------------|----------------------------|--------------------|----------------------------|
| | | | Horizon Gain (dBi) | Coordination Distance (km) | Horizon Gain (dBi) | Coordination Distance (km) |
| 0 | 1.20 | 103.20 | -10.00 | 170.47 | -10.00 | 100.00 |
| 5 | 1.02 | 108.16 | -10.00 | 176.53 | -10.00 | 100.00 |
| 10 | 0.93 | 113.12 | -10.00 | 180.86 | -10.00 | 100.00 |
| 15 | 1.01 | 118.09 | -10.00 | 176.99 | -10.00 | 100.00 |
| 20 | 0.75 | 121.11 | -10.00 | 190.14 | -10.00 | 102.43 |
| 25 | 0.50 | 117.69 | -10.00 | 203.19 | -10.00 | 114.00 |
| 30 | 0.30 | 114.20 | -10.00 | 217.97 | -10.00 | 129.35 |
| 35 | 0.27 | 110.68 | -10.00 | 220.04 | -10.00 | 129.84 |
| 40 | 0.00 | 107.03 | -10.00 | 227.19 | -10.00 | 136.02 |
| 45 | 0.00 | 103.39 | -10.00 | 227.19 | -10.00 | 136.02 |
| 50 | 0.00 | 99.71 | -10.00 | 227.19 | -10.00 | 136.02 |
| 55 | 0.00 | 96.00 | -10.00 | 227.19 | -10.00 | 136.02 |
| 60 | 0.35 | 92.27 | -10.00 | 213.01 | -10.00 | 125.08 |
| 65 | 1.04 | 88.49 | -10.00 | 175.84 | -10.00 | 100.00 |
| 70 | 1.62 | 84.65 | -10.00 | 154.28 | -10.00 | 100.00 |
| 75 | 3.00 | 80.65 | -10.00 | 124.61 | -10.00 | 100.00 |
| 80 | 3.80 | 76.64 | -10.00 | 111.02 | -10.00 | 100.00 |
| 85 | 4.17 | 72.69 | -10.00 | 105.57 | -10.00 | 100.00 |
| 90 | 4.20 | 68.85 | -10.00 | 105.24 | -10.00 | 100.00 |
| 95 | 3.23 | 65.44 | -10.00 | 120.62 | -10.00 | 100.00 |
| 100 | 2.06 | 62.33 | -10.00 | 141.87 | -10.00 | 100.00 |
| 105 | 2.61 | 58.64 | -10.00 | 130.50 | -10.00 | 100.00 |
| 110 | 3.12 | 55.04 | -10.00 | 122.44 | -10.00 | 100.00 |
| 115 | 3.28 | 51.78 | -10.00 | 119.80 | -10.00 | 100.00 |
| 120 | 3.36 | 48.75 | -10.00 | 118.33 | -10.00 | 100.00 |
| 125 | 3.46 | 45.97 | -9.56 | 118.26 | -9.56 | 100.00 |
| 130 | 2.92 | 44.00 | -9.09 | 129.42 | -9.09 | 100.00 |
| 135 | 2.33 | 42.52 | -8.72 | 141.44 | -8.72 | 100.00 |
| 140 | 1.62 | 41.63 | -8.49 | 161.78 | -8.49 | 100.00 |
| 145 | 1.07 | 41.10 | -8.35 | 182.46 | -8.35 | 100.00 |
| 150 | 0.87 | 40.74 | -8.25 | 191.86 | -8.25 | 102.02 |
| 155 | 0.49 | 41.07 | -8.34 | 207.63 | -8.34 | 118.65 |
| 160 | 0.42 | 41.58 | -8.47 | 213.07 | -8.47 | 123.65 |
| 165 | 0.66 | 42.29 | -8.65 | 200.53 | -8.65 | 110.17 |
| 170 | 0.94 | 43.21 | -8.89 | 185.37 | -8.89 | 100.00 |
| 175 | 1.10 | 43.80 | -9.04 | 178.34 | -9.04 | 100.00 |
| 180 | 1.23 | 43.93 | -9.07 | 174.26 | -9.07 | 100.00 |
| 185 | 1.55 | 43.36 | -8.93 | 161.82 | -8.93 | 100.00 |

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Coordination Values

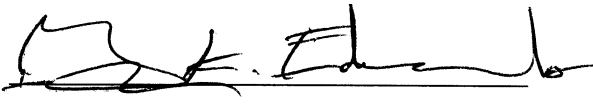
QUICKSBURG, VA

| | | | |
|--------------------------|----------------------|----------------------|--------------------------|
| Licensee Name | EchoStar Corporation | | |
| Latitude (NAD 83) | 38° 43' 24.6" N | | |
| Longitude (NAD 83) | 78° 40' 1.4" W | | |
| Ground Elevation (AMSL) | 284.27 m / 932.7 ft | | |
| Antenna Centerline (AGL) | 5.49 m / 18.0 ft | | |
| Antenna Model | Vertex 9 Meter | | |
| Antenna Mode | Receive 12.2 GHz | | Transmit 17.3 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 | | -5.7 (dBW/4 kHz) | |

| Azimuth (°) | Horizon Elevation (°) | Antenna Discrimination (°) | Receive 12.2 GHz | | Transmit 17.3 GHz | |
|-------------|-----------------------|----------------------------|--------------------|----------------------------|--------------------|----------------------------|
| | | | Horizon Gain (dBi) | Coordination Distance (km) | Horizon Gain (dBi) | Coordination Distance (km) |
| 190 | 2.13 | 42.06 | -8.60 | 146.49 | -8.60 | 100.00 |
| 195 | 1.96 | 41.02 | -8.33 | 151.83 | -8.33 | 100.00 |
| 200 | 1.73 | 39.59 | -7.94 | 160.82 | -7.94 | 100.00 |
| 205 | 1.27 | 37.95 | -7.48 | 180.40 | -7.48 | 100.00 |
| 210 | 1.21 | 35.60 | -6.79 | 185.38 | -6.79 | 100.00 |
| 215 | 1.06 | 33.02 | -5.97 | 193.63 | -5.97 | 101.08 |
| 220 | 1.64 | 29.64 | -4.80 | 182.00 | -4.80 | 100.00 |
| 225 | 2.31 | 26.01 | -3.38 | 170.51 | -3.38 | 100.00 |
| 230 | 2.77 | 22.39 | -1.75 | 167.72 | -1.75 | 100.00 |
| 235 | 2.89 | 18.89 | 0.10 | 174.75 | 0.10 | 100.00 |
| 240 | 2.50 | 15.61 | 2.17 | 193.78 | 2.17 | 100.00 |
| 245 | 2.02 | 12.28 | 4.77 | 213.23 | 4.77 | 109.48 |
| 250 | 1.51 | 8.90 | 8.26 | 247.34 | 8.26 | 132.24 |
| 255 | 1.80 | 5.81 | 12.89 | 359.50 | 12.89 | 198.97 |
| 260 | 2.15 | 6.15 | 12.28 | 252.68 | 12.28 | 132.31 |
| 265 | 2.70 | 9.49 | 7.57 | 212.42 | 7.57 | 106.38 |
| 270 | 2.84 | 14.01 | 3.34 | 192.01 | 3.34 | 100.00 |
| 275 | 3.72 | 18.63 | 0.25 | 153.35 | 0.25 | 100.00 |
| 280 | 2.76 | 23.70 | -2.37 | 162.08 | -2.37 | 100.00 |
| 285 | 3.18 | 28.56 | -4.39 | 142.23 | -4.39 | 100.00 |
| 290 | 3.01 | 33.53 | -6.14 | 138.08 | -6.14 | 100.00 |
| 295 | 3.01 | 38.49 | -7.63 | 131.98 | -7.63 | 100.00 |
| 300 | 3.01 | 43.45 | -8.95 | 128.32 | -8.95 | 100.00 |
| 305 | 2.95 | 48.43 | -10.00 | 125.62 | -10.00 | 100.00 |
| 310 | 2.89 | 53.41 | -10.00 | 126.66 | -10.00 | 100.00 |
| 315 | 2.78 | 58.39 | -10.00 | 128.72 | -10.00 | 100.00 |
| 320 | 2.95 | 63.36 | -10.00 | 125.54 | -10.00 | 100.00 |
| 325 | 2.46 | 68.36 | -10.00 | 133.34 | -10.00 | 100.00 |
| 330 | 2.87 | 73.33 | -10.00 | 126.93 | -10.00 | 100.00 |
| 335 | 2.25 | 78.33 | -10.00 | 137.73 | -10.00 | 100.00 |
| 340 | 1.82 | 83.31 | -10.00 | 148.29 | -10.00 | 100.00 |
| 345 | 1.69 | 88.29 | -10.00 | 152.31 | -10.00 | 100.00 |
| 350 | 1.22 | 93.26 | -10.00 | 169.78 | -10.00 | 100.00 |
| 355 | 1.08 | 98.23 | -10.00 | 174.72 | -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 23, 2017



NATIONAL RADIO ASTRONOMY OBSERVATORY

POST OFFICE BOX 2
GREEN BANK, WV 24944-0002
NRQZ OFFICE TELEPHONE (304) 456-2107
HTTP://WWW.GB.NRAO.EDU/

FAX (304) 456-2276
NRQZ@NRAO.EDU

March 21, 2017
NRQZ ID: 10660_09FEB2017

Attn. Regulatory Group
EchoStar Operating LLC
100 Inverness Terrace East
Englewood, CO 80112

| | |
|--------------------------------|--|
| Application Reason/Purpose | Coordination prior to FCC application submission |
| File Number | Shall be provided by applicant |
| Applicant Name | Addressee |
| Call Sign | E070273 |
| Site Name or Loc | Quicksburg, VA |
| Frequency Coordinator | Comsearch 170209COMSGE09 |
| Previous NRAO Coordination No. | NRQZ ID None – New paths |
| Current NRAO Coordination No. | NRQZ ID 10660_09FEB2017 |

Dear Applicant:

The National Radio Quiet Zone (NRQZ) has evaluated these facilities to determine the interference impact on our highly sensitive radio astronomy operations.

The National Radio Astronomy Observatory (NRAO) site located at Green Bank, Pocahontas County, WV, has no objections to this frequency assignment.

The Sugar Grove Research Station, formerly the Naval Radio Research Observatory (NRRO), located at Sugar Grove, Pendleton County, WV has no objections to this frequency assignment.

This letter constitutes coordination of assignment in the National Radio Quiet Zone as required by the FCC Rules and Regulations 47CFR1.924(a).

If I may be of assistance, please feel free to contact me.

Sincerest regards,

Paulette W. Woody
NRQZ Office Administrator

Cc: Gary Edwards
file: 10660.docx

Attachments: Comsearch Earth Station Data Sheet

This concurrence remains valid provided the data contained within is consistent with the applicant's filing at the Commission. Any discrepancy in system parameters, such as geographical coordinates (Latitude, Longitude, AMSL), antenna height above ground level (AGL), antenna gains or directivity (orientation), channel (operating frequency or frequency bands), emission type, and power requires re-coordination. If the Commission has questions regarding the validity of this or any concurrence, please direct inquiries to nrqz@nrao.edu or 304-456-2107.

Reference Copy

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 <http://www.comsearch.com>

Date: 02/09/2017
Job Number: 170209COMSGE09

Administrative Information

Status: ENGINEER PROPOSAL
Call Sign: E070273
Licensee Code: ZECHOS
Licensee Name: EchoStar Corporation

Site Information

QUICKSBURG, VA

Venue Name
Latitude (NAD 83): 38° 43' 24.6" N
Longitude (NAD 83): 78° 40' 1.4" W
Climate Zone: A
Rain Zone: 2
Ground Elevation (AMSL): 284.27 m / 932.7 ft

Link Information

Satellite Type: Geostationary
Mode: TR - Transmit-Receive
Modulation: Digital
Satellite Arc: 61° W to 148° West Longitude
Azimuth Range: 153.0° to 256.7°
Corresponding Elevation Angles: 41.5° / 7.4°
Antenna Centerline (AGL): 5.49 m / 18.0 ft

Antenna Information

| | | Receive - FCC32 | Transmit - FCC32 | |
|--------------------------|--------------------------|------------------|------------------|--------------------------|
| Manufacturer | | Vertex | Vertex | |
| Model | | 9 Meter | 9 Meter | |
| Gain / Diameter | | 58.6 dBi / 9.0 m | 62.9 dBi / 9.0 m | |
| 3-dB / 15-dB Beamwidth | | 0.20° / 0.40° | 0.10° / 0.30° | |
| Max Available RF Power | (dBW/4 kHz) (dBW/MHz) | | -5.7 18.3 | |
| Maximum EIRP | (dBW/4 kHz) (dBW/MHz) | | 57.2 81.2 | |
| 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 12.2 GHz | Transmit 17.3 GHz |
|--|---------------------------------------|---------------------------------------|
| Emission / Frequency Range (MHz) | 1M50G2D - 24M0M1F / 12200.0 - 12700.0 | 1M50G2D - 24M0M1F / 17300.0 - 17800.0 |
| Max Great Circle Coordination Distance | 359.5 km / 223.4 mi | 199.0 km / 123.6 mi |
| Precipitation Scatter Contour Radius | 561.4 km / 348.8 mi | 100.0 km / 62.1 mi |