

Ka-Band Earth Station – Bristow, VA

Frequency Coordination Report

28 GHz



Prepared on Behalf of
O3b Networks USA, LLC

August 9, 2016





Table of Contents

| | |
|-------------------------------------------------------|---------------|
| 1. Summary of Results | - 1 - |
| 2. 28 GHz Common Carrier and LTTS Coordination | - 1 - |
| 3. 28 GHz LMDS Coordination | - 2 - |
| 4. Earth Station Coordination Data | - 3 - |
| 5. Contact Information | - 13 - |

1. Summary of Results

On behalf of Ob3 Networks, Comsearch performed a coordination notice for all existing and proposed terrestrial licenses within the coordination contours of their proposed Ka-Band earth station in Bristow, VA, which will transmit at 28 GHz¹. Prior-notification letters were sent to the licensees and a copy of the notification data is provided in section four of this report. The earth station coordination was finalized on August 9, 2016.

No objections were received from any of the incumbent 28 GHz licensees. Our notification to the LMDS incumbents was performed under the assumption that the earth station would be operating on a secondary basis to LMDS Block A operations and a contact at O3b Networks has been provided in case any concerns may arise in the future.

2. 28 GHz Common Carrier and LTTTS Coordination

In accordance with FCC Rules and Regulations, the Ka-Band earth station in Bristow, VA was prior-coordinated by Comsearch. A notification letter and datasheets for this earth station were sent to the following 28 GHz common carrier fixed microwave licensees on July 20, 2016. These licensees are authorized to operate temporary fixed operations from 27.5 – 29.5 GHz over a designated geographic area.

| Licensee | Authorized Geographic Area |
|----------|----------------------------------------------------|
| Frontier | Continental US |
| Verizon | Statewide: Maryland; Washington DC and Vicinity |

A notification letter and datasheets for the Ka-Band earth station in Bristow, VA were also sent to the following 28 GHz local television transmission licensee on July 20, 2016. This licensee is authorized to operate temporary fixed operations from 27.5 – 29.5 GHz on a nationwide basis.

| Licensee | Authorized Geographic Area |
|--------------------------------|----------------------------|
| Information Super Station, LLC | Continental US |

No objections were received from the common carrier or local television transmission service incumbents.

¹ The proposed earth station will operate in the 27.60 – 28.35 GHz portion of the Ka-Band.

3. 28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on July 20, 2016. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

| Licensee | Market | Market Name |
|---------------------|---------------------|-------------------------|
| Nextlink/XO | BTA029 | Baltimore, MD |
| Sprint ² | BTA029 | Baltimore, MD |
| Nextlink/XO | BTA374 | Richmond-Petersburg, VA |
| Nextlink/XO | BTA461 ³ | Washington, DC |

No objections were received from the LMDS incumbents.

² Sprint is leasing LMDS spectrum from Nextlink Wireless / XO in the Baltimore, MD Basic Trading Area (BTA).

³ The proposed earth station will be located inside BTA461.



4. Earth Station Coordination Data

This section presents the data pertinent to the proposed Ka-Band earth station in Bristow, VA. This data was circulated to all incumbent licensees in the shared 28 GHz frequency ranges.

COMSEARCH**Earth Station Data Sheet**

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

Date: 07/20/2016
 Job Number: <PCNJobCode>

Administrative Information

Status ENGINEER PROPOSAL
 Call Sign <PCNCallSign>
 Licensee Code O3BNET
 Licensee Name O3b Networks USA, LLC.

Site Information **BRISTOW, VA**

Venue Name
 Latitude (NAD 83) 38° 46' 59.9" N
 Longitude (NAD 83) 77° 34' 25.3" W
 Climate Zone A
 Rain Zone 2
 Ground Elevation (AMSL) 86.32 m / 283.2 ft

Link Information

Satellite Type Medium Earth Orbit
 Mode TO - Transmit-Only
 Modulation Digital
 Minimum Elevation Angle 7.0°
 Azimuth Range 0.0° to 360°
 Antenna Centerline (AGL) 2.74 m / 9.0 ft

Antenna Information **Transmit - FCC32**

Manufacturer AVL
 Model 85cm-O3B
 Gain / Diameter 46.0 dBi / 0.85 m
 3-dB / 15-dB Beamwidth 0.90° / 2.10°

Max Available RF Power (dBW/4 kHz) -34.6
 (dBW/MHz) -10.6

Maximum EIRP (dBW/4 kHz) 11.4
 (dBW/MHz) 35.4

Interference Objectives: Long Term -151.0 dBW/4 kHz 20%
 Short Term -128.0 dBW/4 kHz 0.0025%

Frequency Information **Transmit 28.0 GHz**

Emission / Frequency Range (MHz) 216MG7D / 27600.0 - 28350.0

Max Great Circle Coordination Distance 100.0 km / 62.1 mi
 Precipitation Scatter Contour Radius 100.0 km / 62.1 mi

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Coordination Values**BRISTOW, VA**

Licensee Name O3b Networks USA, LLC.
 Latitude (NAD 83) 38° 46' 59.9" N
 Longitude (NAD 83) 77° 34' 25.3" W
 Ground Elevation (AMSL) 86.32 m / 283.2 ft
 Antenna Centerline (AGL) 2.74 m / 9.0 ft
 Antenna Model AVL 0.85m
 Antenna Mode Transmit 28.0 GHz
 Interference Objectives: Long Term -151.0 dBW/4 kHz 20%
 Short Term -128.0 dBW/4 kHz 0.0025%
 Max Available RF Power -34.6 (dBW/4 kHz)

| Azimuth (°) | Horizon Elevation (°) | Antenna Discrimination (°) | Transmit 28.0 GHz | |
|-------------|-----------------------|----------------------------|--------------------|----------------------------|
| | | | Horizon Gain (dBi) | Coordination Distance (km) |
| 0 | 0.77 | 97.86 | -10.00 | 100.00 |
| 5 | 0.94 | 92.86 | -10.00 | 100.00 |
| 10 | 0.94 | 87.86 | -10.00 | 100.00 |
| 15 | 0.88 | 82.86 | -10.00 | 100.00 |
| 20 | 0.87 | 77.86 | -10.00 | 100.00 |
| 25 | 0.81 | 72.86 | -10.00 | 100.00 |
| 30 | 0.77 | 67.86 | -10.00 | 100.00 |
| 35 | 0.57 | 62.86 | -10.00 | 100.00 |
| 40 | 0.57 | 57.86 | -10.00 | 100.00 |
| 45 | 0.65 | 52.86 | -10.00 | 100.00 |
| 50 | 0.46 | 47.86 | -10.00 | 100.00 |
| 55 | 0.43 | 42.86 | -10.00 | 100.00 |
| 60 | 0.00 | 37.87 | -10.00 | 100.00 |
| 65 | 0.00 | 32.87 | -9.61 | 100.00 |
| 70 | 0.00 | 27.88 | -8.45 | 100.00 |
| 75 | 0.00 | 22.88 | -7.17 | 100.00 |
| 80 | 0.00 | 17.89 | -5.76 | 100.00 |
| 85 | 0.41 | 12.87 | -4.11 | 100.00 |
| 90 | 0.71 | 7.86 | -2.26 | 100.00 |
| 95 | 0.83 | 2.86 | -0.26 | 100.00 |
| 100 | 1.01 | 2.14 | 1.84 | 100.00 |
| 105 | 1.11 | 7.14 | 3.58 | 100.00 |
| 110 | 1.08 | 12.14 | 4.14 | 100.00 |
| 115 | 1.21 | 17.14 | 3.35 | 100.00 |
| 120 | 1.29 | 22.14 | 1.55 | 100.00 |
| 125 | 1.36 | 27.14 | -0.48 | 100.00 |
| 130 | 1.47 | 32.14 | -2.17 | 100.00 |
| 135 | 1.55 | 37.14 | -3.59 | 100.00 |
| 140 | 1.60 | 42.14 | -4.79 | 100.00 |
| 145 | 1.44 | 47.14 | -5.85 | 100.00 |
| 150 | 0.85 | 52.14 | -6.86 | 100.00 |
| 155 | 0.85 | 57.14 | -7.56 | 100.00 |
| 160 | 0.70 | 62.14 | -8.17 | 100.00 |
| 165 | 0.67 | 67.14 | -8.62 | 100.00 |
| 170 | 0.64 | 72.14 | -8.94 | 100.00 |
| 175 | 0.71 | 77.14 | -9.12 | 100.00 |
| 180 | 0.44 | 82.14 | -9.24 | 100.00 |
| 185 | 0.63 | 87.14 | -9.14 | 100.00 |

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 Ground Elevation (AMSL) 86.32 m / 283.2 ft
 Antenna Centerline (AGL) 2.74 m / 9.0 ft
 Antenna Model AVL 0.85m
 Antenna Mode Transmit 28.0 GHz
 Interference Objectives: Long Term -151.0 dBW/4 kHz 20%
 Short Term -128.0 dBW/4 kHz 0.0025%
 Max Available RF Power -34.6 (dBW/4 kHz)

| Azimuth (°) | Horizon Elevation (°) | Antenna Discrimination (°) | Transmit 28.0 GHz | |
|-------------|-----------------------|----------------------------|--------------------|----------------------------|
| | | | Horizon Gain (dBi) | Coordination Distance (km) |
| 190 | 0.73 | 92.14 | -8.92 | 100.00 |
| 195 | 0.44 | 97.14 | -8.68 | 100.00 |
| 200 | 0.00 | 102.14 | -8.34 | 100.00 |
| 205 | 0.00 | 107.14 | -7.77 | 100.00 |
| 210 | 0.21 | 112.14 | -7.01 | 100.00 |
| 215 | 0.28 | 117.14 | -6.15 | 100.00 |
| 220 | 0.32 | 122.14 | -5.14 | 100.00 |
| 225 | 0.32 | 127.14 | -3.95 | 100.00 |
| 230 | 0.29 | 132.14 | -2.56 | 100.00 |
| 235 | 0.40 | 137.14 | -0.83 | 100.00 |
| 240 | 0.49 | 142.14 | 1.14 | 100.00 |
| 245 | 0.51 | 147.14 | 2.82 | 100.00 |
| 250 | 0.50 | 152.14 | 3.58 | 100.00 |
| 255 | 0.51 | 157.14 | 3.03 | 100.00 |
| 260 | 0.52 | 162.13 | 1.47 | 100.00 |
| 265 | 0.59 | 167.13 | -0.44 | 100.00 |
| 270 | 0.64 | 172.13 | -2.35 | 100.00 |
| 275 | 0.64 | 177.12 | -4.12 | 100.00 |
| 280 | 0.60 | 177.83 | -5.73 | 100.00 |
| 285 | 0.58 | 172.85 | -7.16 | 100.00 |
| 290 | 0.77 | 167.86 | -8.43 | 100.00 |
| 295 | 0.84 | 162.86 | -9.60 | 100.00 |
| 300 | 0.98 | 157.86 | -10.00 | 100.00 |
| 305 | 0.96 | 152.86 | -10.00 | 100.00 |
| 310 | 0.99 | 147.86 | -10.00 | 100.00 |
| 315 | 0.94 | 142.86 | -10.00 | 100.00 |
| 320 | 0.84 | 137.86 | -10.00 | 100.00 |
| 325 | 1.06 | 132.86 | -10.00 | 100.00 |
| 330 | 0.97 | 127.86 | -10.00 | 100.00 |
| 335 | 1.00 | 122.86 | -10.00 | 100.00 |
| 340 | 0.90 | 117.86 | -10.00 | 100.00 |
| 345 | 0.86 | 112.86 | -10.00 | 100.00 |
| 350 | 0.88 | 107.86 | -10.00 | 100.00 |
| 355 | 0.75 | 102.86 | -10.00 | 100.00 |

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Link Information

Satellite Type Medium Earth Orbit
 Mode TO - Transmit-Only
 Modulation Digital
 Minimum Elevation Angle 7.0°
 Azimuth Range 0.0° to 360°
 Antenna Centerline (AGL) 2.74 m / 9.0 ft

Antenna Information **Transmit - FCC32**

Manufacturer AVL
 Model 2.4M-O3B
 Gain / Diameter 54.7 dBi / 2.4 m
 3-dB / 15-dB Beamwidth 0.14° / 0.32°

Max Available RF Power (dBW/4 kHz) -31.5
 (dBW/MHz) -7.5

Maximum EIRP (dBW/4 kHz) 23.2
 (dBW/MHz) 47.2

Interference Objectives: Long Term -151.0 dBW/4 kHz 20%
 Short Term -128.0 dBW/4 kHz 0.0025%

Frequency Information **Transmit 28.0 GHz**

Emission / Frequency Range (MHz) 216MG7D / 27600.0 - 28350.0

Max Great Circle Coordination Distance 100.0 km / 62.1 mi
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 Max Available RF Power -31.5 (dBW/4 kHz)

| Azimuth (°) | Horizon Elevation (°) | Antenna Discrimination (°) | Transmit 28.0 GHz | |
|-------------|-----------------------|----------------------------|--------------------|----------------------------|
| | | | Horizon Gain (dBi) | Coordination Distance (km) |
| 0 | 0.77 | 97.86 | -10.00 | 100.00 |
| 5 | 0.94 | 92.86 | -10.00 | 100.00 |
| 10 | 0.94 | 87.86 | -10.00 | 100.00 |
| 15 | 0.88 | 82.86 | -10.00 | 100.00 |
| 20 | 0.87 | 77.86 | -10.00 | 100.00 |
| 25 | 0.81 | 72.86 | -10.00 | 100.00 |
| 30 | 0.77 | 67.86 | -10.00 | 100.00 |
| 35 | 0.57 | 62.86 | -10.00 | 100.00 |
| 40 | 0.57 | 57.86 | -10.00 | 100.00 |
| 45 | 0.65 | 52.86 | -10.00 | 100.00 |
| 50 | 0.46 | 47.86 | -10.00 | 100.00 |
| 55 | 0.43 | 42.86 | -10.00 | 100.00 |
| 60 | 0.00 | 37.87 | -10.00 | 100.00 |
| 65 | 0.00 | 32.87 | -9.61 | 100.00 |
| 70 | 0.00 | 27.88 | -8.45 | 100.00 |
| 75 | 0.00 | 22.88 | -7.17 | 100.00 |
| 80 | 0.00 | 17.89 | -5.76 | 100.00 |
| 85 | 0.41 | 12.87 | -4.11 | 100.00 |
| 90 | 0.71 | 7.86 | -2.26 | 100.00 |
| 95 | 0.83 | 2.86 | -0.26 | 100.00 |
| 100 | 1.01 | 2.14 | 1.84 | 100.00 |
| 105 | 1.11 | 7.14 | 3.58 | 100.00 |
| 110 | 1.08 | 12.14 | 4.14 | 100.00 |
| 115 | 1.21 | 17.14 | 3.35 | 100.00 |
| 120 | 1.29 | 22.14 | 1.55 | 100.00 |
| 125 | 1.36 | 27.14 | -0.48 | 100.00 |
| 130 | 1.47 | 32.14 | -2.17 | 100.00 |
| 135 | 1.55 | 37.14 | -3.59 | 100.00 |
| 140 | 1.60 | 42.14 | -4.79 | 100.00 |
| 145 | 1.44 | 47.14 | -5.85 | 100.00 |
| 150 | 0.85 | 52.14 | -6.86 | 100.00 |
| 155 | 0.85 | 57.14 | -7.56 | 100.00 |
| 160 | 0.70 | 62.14 | -8.17 | 100.00 |
| 165 | 0.67 | 67.14 | -8.62 | 100.00 |
| 170 | 0.64 | 72.14 | -8.94 | 100.00 |
| 175 | 0.71 | 77.14 | -9.12 | 100.00 |
| 180 | 0.44 | 82.14 | -9.24 | 100.00 |
| 185 | 0.63 | 87.14 | -9.14 | 100.00 |

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Max Available RF Power -31.5 (dBW/4 kHz)

| Azimuth (°) | Horizon Elevation (°) | Antenna Discrimination (°) | Transmit 28.0 GHz | |
|-------------|-----------------------|----------------------------|--------------------|----------------------------|
| | | | Horizon Gain (dBi) | Coordination Distance (km) |
| 190 | 0.73 | 92.14 | -8.92 | 100.00 |
| 195 | 0.44 | 97.14 | -8.68 | 100.00 |
| 200 | 0.00 | 102.14 | -8.34 | 100.00 |
| 205 | 0.00 | 107.14 | -7.77 | 100.00 |
| 210 | 0.21 | 112.14 | -7.01 | 100.00 |
| 215 | 0.28 | 117.14 | -6.15 | 100.00 |
| 220 | 0.32 | 122.14 | -5.14 | 100.00 |
| 225 | 0.32 | 127.14 | -3.95 | 100.00 |
| 230 | 0.29 | 132.14 | -2.56 | 100.00 |
| 235 | 0.40 | 137.14 | -0.83 | 100.00 |
| 240 | 0.49 | 142.14 | 1.14 | 100.00 |
| 245 | 0.51 | 147.14 | 2.82 | 100.00 |
| 250 | 0.50 | 152.14 | 3.58 | 100.00 |
| 255 | 0.51 | 157.14 | 3.03 | 100.00 |
| 260 | 0.52 | 162.13 | 1.47 | 100.00 |
| 265 | 0.59 | 167.13 | -0.44 | 100.00 |
| 270 | 0.64 | 172.13 | -2.35 | 100.00 |
| 275 | 0.64 | 177.12 | -4.12 | 100.00 |
| 280 | 0.60 | 177.83 | -5.73 | 100.00 |
| 285 | 0.58 | 172.85 | -7.16 | 100.00 |
| 290 | 0.77 | 167.86 | -8.43 | 100.00 |
| 295 | 0.84 | 162.86 | -9.60 | 100.00 |
| 300 | 0.98 | 157.86 | -10.00 | 100.00 |
| 305 | 0.96 | 152.86 | -10.00 | 100.00 |
| 310 | 0.99 | 147.86 | -10.00 | 100.00 |
| 315 | 0.94 | 142.86 | -10.00 | 100.00 |
| 320 | 0.84 | 137.86 | -10.00 | 100.00 |
| 325 | 1.06 | 132.86 | -10.00 | 100.00 |
| 330 | 0.97 | 127.86 | -10.00 | 100.00 |
| 335 | 1.00 | 122.86 | -10.00 | 100.00 |
| 340 | 0.90 | 117.86 | -10.00 | 100.00 |
| 345 | 0.86 | 112.86 | -10.00 | 100.00 |
| 350 | 0.88 | 107.86 | -10.00 | 100.00 |
| 355 | 0.75 | 102.86 | -10.00 | 100.00 |



5. Contact Information

For questions or information regarding the 28 GHz Frequency Coordination Report, please contact:

| | |
|-----------------|----------------------------------------------------------------|
| Contact person: | Joanna Lynch |
| Title: | Manager, Spectrum & Data Solutions |
| Company: | Comsearch |
| Address: | 19700 Janelia Farm Blvd., Ashburn, VA 20147 |
| Telephone: | 703-726-5711 |
| Fax: | 703-726-5599 |
| Email: | jlynch@comsearch.com |
| Web site: | www.comsearch.com |