

Ka-Band Earth Station – Los Alamitos, CA

Frequency Coordination Report

28 GHz



Prepared on Behalf of
O3b Networks USA, LLC

March 28, 2016





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1. Summary of Results

On behalf of O3b 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 Los Alamitos, California, 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 March 25, 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 non-interference basis in relation to primary LMDS Block A operations. A contact at O3b Networks has been provided in case any concerns may arise in the future.

2. 28 GHz Common Carrier and LTTS Coordination

In accordance with FCC Rules and Regulations, the Ka-Band earth station in Los Alamitos, California 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 February 23, 2016. These licensees are authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a statewide or nationwide basis.

| Licensee | Authorized Geographic Area |
|-----------------------|----------------------------|
| M.U.T. Licensing, LLC | Statewide: California |
| Verizon | Continental US |

A notification letter and datasheets for the Ka-Band earth station in Los Alamitos, California were also sent to the following 28 GHz local television transmission licensee on February 23, 2016. This licensee is authorized to operate temporary fixed operations from 27.5 to 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 27.6 – 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 February 23, 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 | BTA262 ² | Los Angeles, CA |
| TelePacific Communications ³ | BTA262 | Los Angeles, CA |
| T-Mobile ⁴ | BTA262 | Los Angeles, CA |
| Towerstream Corporation ⁵ | BTA262 | Los Angeles, CA |
| EchoStar | BTA402 | San Diego, CA |
| Nextlink/XO ⁶ | BTA402 | San Diego, CA |

No objections were received from the LMDS incumbents.

² The proposed earth station will be located in BTA262.

³ TelePacific is leasing spectrum from Nextlink/XO in the Los Angeles Basic Trading Area (BTA).

⁴ T-Mobile has acquired spectrum from Nextlink/XO in the Los Angeles BTA.

⁵ Towerstream is leasing spectrum Nextlink/XO in the Los Angeles BTA.

⁶ Nextlink/XO is leasing spectrum from EchoStar in the San Diego BTA.

4. Earth Station Coordination Data

This section presents the data pertinent to the proposed Ka-Band earth station in Los Alamitos, California. 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: 02/19/2016
 Job Number: <PCNJobCode>

Administrative Information

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

Site Information **LOS ALAMITOS, CA**

Venue Name
 Latitude (NAD 83) 33° 47' 41.1" N
 Longitude (NAD 83) 118° 2' 58.6" W
 Climate Zone A
 Rain Zone 4
 Ground Elevation (AMSL) 8.34 m / 27.4 ft

Link Information

Satellite Type Medium Earth Orbit
 Mode TO - Transmit-Only
 Modulation Digital
 Minimum Elevation Angle 10.0°
 Azimuth Range 0.0° to 360°
 Antenna Centerline (AGL) 2.74 m / 9.0 ft

Antenna Information **Transmit - FCC32**

Manufacturer AVL
 Model 85CM-03B
 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

COMSEARCH**Earth Station Data Sheet**

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 (703)726-5662 <http://www.comsearch.com>

Coordination Values**LOS ALAMITOS, CA**

Licensee Name O3b Networks USA, LLC.
 Latitude (NAD 83) 33° 47' 41.1" N
 Longitude (NAD 83) 118° 2' 58.6" W
 Ground Elevation (AMSL) 8.34 m / 27.4 ft
 Antenna Centerline (AGL) 2.74 m / 9.0 ft
 Antenna Model AVL 0.85 Meter
 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 | 0.00 | 75.83 | -10.00 | 100.00 |
| 5 | 0.00 | 71.59 | -10.00 | 100.00 |
| 10 | 0.00 | 67.38 | -10.00 | 100.00 |
| 15 | 0.00 | 63.24 | -10.00 | 100.00 |
| 20 | 0.00 | 59.16 | -10.00 | 100.00 |
| 25 | 0.00 | 55.18 | -10.00 | 100.00 |
| 30 | 0.00 | 51.31 | -10.00 | 100.00 |
| 35 | 0.00 | 47.59 | -10.00 | 100.00 |
| 40 | 0.00 | 44.06 | -10.00 | 100.00 |
| 45 | 0.00 | 40.77 | -10.00 | 100.00 |
| 50 | 0.00 | 37.79 | -10.00 | 100.00 |
| 55 | 0.00 | 35.20 | -10.00 | 100.00 |
| 60 | 0.00 | 33.08 | -9.14 | 100.00 |
| 65 | 0.00 | 31.54 | -7.89 | 100.00 |
| 70 | 0.00 | 30.67 | -6.49 | 100.00 |
| 75 | 0.00 | 30.53 | -4.91 | 100.00 |
| 80 | 0.00 | 31.11 | -3.09 | 100.00 |
| 85 | 0.00 | 32.39 | -1.00 | 100.00 |
| 90 | 0.00 | 34.29 | 1.39 | 100.00 |
| 95 | 0.00 | 36.71 | 3.98 | 100.00 |
| 100 | 0.00 | 39.54 | 6.12 | 100.00 |
| 105 | 0.00 | 42.72 | 6.47 | 100.00 |
| 110 | 0.00 | 46.16 | 4.72 | 100.00 |
| 115 | 0.00 | 49.81 | 2.17 | 100.00 |
| 120 | 0.00 | 53.62 | -0.26 | 100.00 |
| 125 | 0.00 | 57.56 | -2.23 | 100.00 |
| 130 | 0.00 | 61.61 | -3.85 | 100.00 |
| 135 | 0.00 | 65.73 | -5.23 | 100.00 |
| 140 | 0.00 | 69.91 | -6.40 | 100.00 |
| 145 | 0.00 | 74.14 | -7.40 | 100.00 |
| 150 | 0.00 | 78.40 | -8.25 | 100.00 |
| 155 | 0.00 | 82.69 | -8.97 | 100.00 |
| 160 | 0.00 | 86.99 | -9.56 | 100.00 |
| 165 | 0.00 | 91.30 | -10.00 | 100.00 |
| 170 | 0.00 | 95.60 | -10.00 | 100.00 |
| 175 | 0.00 | 99.90 | -10.00 | 100.00 |
| 180 | 0.00 | 104.17 | -10.00 | 100.00 |
| 185 | 0.00 | 108.41 | -10.00 | 100.00 |

COMSEARCH**Earth Station Data Sheet**

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| | |
|------------------------------------|--------------------------|
| Coordination Values | LOS ALAMITOS, CA |
| Licensee Name | O3b Networks USA, LLC. |
| Latitude (NAD 83) | 33° 47' 41.1" N |
| Longitude (NAD 83) | 118° 2' 58.6" W |
| Ground Elevation (AMSL) | 8.34 m / 27.4 ft |
| Antenna Centerline (AGL) | 2.74 m / 9.0 ft |
| Antenna Model | AVL 0.85 Meter |
| 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 | 0.00 | 112.62 | -10.00 | 100.00 |
| 195 | 0.00 | 116.76 | -10.00 | 100.00 |
| 200 | 0.00 | 120.84 | -9.56 | 100.00 |
| 205 | 0.00 | 124.82 | -8.97 | 100.00 |
| 210 | 0.00 | 128.69 | -8.25 | 100.00 |
| 215 | 0.00 | 132.41 | -7.40 | 100.00 |
| 220 | 0.00 | 135.94 | -6.40 | 100.00 |
| 225 | 0.00 | 139.23 | -5.23 | 100.00 |
| 230 | 0.00 | 142.21 | -3.85 | 100.00 |
| 235 | 0.00 | 144.80 | -2.23 | 100.00 |
| 240 | 0.00 | 146.92 | -0.26 | 100.00 |
| 245 | 0.00 | 148.46 | 2.16 | 100.00 |
| 250 | 0.00 | 149.33 | 4.69 | 100.00 |
| 255 | 0.00 | 149.47 | 6.40 | 100.00 |
| 260 | 0.00 | 148.89 | 6.02 | 100.00 |
| 265 | 0.00 | 147.61 | 3.89 | 100.00 |
| 270 | 0.00 | 145.71 | 1.33 | 100.00 |
| 275 | 0.00 | 143.29 | -1.05 | 100.00 |
| 280 | 0.00 | 140.46 | -3.13 | 100.00 |
| 285 | 0.00 | 137.28 | -4.94 | 100.00 |
| 290 | 0.00 | 133.84 | -6.52 | 100.00 |
| 295 | 0.00 | 130.19 | -7.91 | 100.00 |
| 300 | 0.00 | 126.38 | -9.16 | 100.00 |
| 305 | 0.00 | 122.44 | -10.00 | 100.00 |
| 310 | 0.00 | 118.39 | -10.00 | 100.00 |
| 315 | 0.00 | 114.27 | -10.00 | 100.00 |
| 320 | 0.00 | 110.09 | -10.00 | 100.00 |
| 325 | 0.00 | 105.86 | -10.00 | 100.00 |
| 330 | 0.00 | 101.60 | -10.00 | 100.00 |
| 335 | 0.00 | 97.31 | -10.00 | 100.00 |
| 340 | 0.00 | 93.01 | -10.00 | 100.00 |
| 345 | 0.00 | 88.70 | -10.00 | 100.00 |
| 350 | 0.00 | 84.40 | -10.00 | 100.00 |
| 355 | 0.00 | 80.10 | -10.00 | 100.00 |

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 Call Sign <PCNCallSign>
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Site Information LOS ALAMITOS, CA

Venue Name
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 Rain Zone 4
 Ground Elevation (AMSL) 8.34 m / 27.4 ft

Link Information

Satellite Type Medium Earth Orbit
 Mode TO - Transmit-Only
 Modulation Digital
 Minimum Elevation Angle 10.0°
 Azimuth Range 0.0° to 360°
 Antenna Centerline (AGL) 2.74 m / 9.0 ft

Antenna Information Transmit - FCC32

Manufacturer AVL
 Model 2.4M-03B
 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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Interference Objectives: Long Term -151.0 dBW/4 kHz 20%
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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 | 0.00 | 75.83 | -10.00 | 100.00 |
| 5 | 0.00 | 71.59 | -10.00 | 100.00 |
| 10 | 0.00 | 67.38 | -10.00 | 100.00 |
| 15 | 0.00 | 63.24 | -10.00 | 100.00 |
| 20 | 0.00 | 59.16 | -10.00 | 100.00 |
| 25 | 0.00 | 55.18 | -10.00 | 100.00 |
| 30 | 0.00 | 51.31 | -10.00 | 100.00 |
| 35 | 0.00 | 47.59 | -10.00 | 100.00 |
| 40 | 0.00 | 44.06 | -10.00 | 100.00 |
| 45 | 0.00 | 40.77 | -10.00 | 100.00 |
| 50 | 0.00 | 37.79 | -10.00 | 100.00 |
| 55 | 0.00 | 35.20 | -10.00 | 100.00 |
| 60 | 0.00 | 33.08 | -9.14 | 100.00 |
| 65 | 0.00 | 31.54 | -7.89 | 100.00 |
| 70 | 0.00 | 30.67 | -6.49 | 100.00 |
| 75 | 0.00 | 30.53 | -4.91 | 100.00 |
| 80 | 0.00 | 31.11 | -3.09 | 100.00 |
| 85 | 0.00 | 32.39 | -1.00 | 100.00 |
| 90 | 0.00 | 34.29 | 1.39 | 100.00 |
| 95 | 0.00 | 36.71 | 3.98 | 100.00 |
| 100 | 0.00 | 39.54 | 6.12 | 100.00 |
| 105 | 0.00 | 42.72 | 6.47 | 100.00 |
| 110 | 0.00 | 46.16 | 4.72 | 100.00 |
| 115 | 0.00 | 49.81 | 2.17 | 100.00 |
| 120 | 0.00 | 53.62 | -0.26 | 100.00 |
| 125 | 0.00 | 57.56 | -2.23 | 100.00 |
| 130 | 0.00 | 61.61 | -3.85 | 100.00 |
| 135 | 0.00 | 65.73 | -5.23 | 100.00 |
| 140 | 0.00 | 69.91 | -6.40 | 100.00 |
| 145 | 0.00 | 74.14 | -7.40 | 100.00 |
| 150 | 0.00 | 78.40 | -8.25 | 100.00 |
| 155 | 0.00 | 82.69 | -8.97 | 100.00 |
| 160 | 0.00 | 86.99 | -9.56 | 100.00 |
| 165 | 0.00 | 91.30 | -10.00 | 100.00 |
| 170 | 0.00 | 95.60 | -10.00 | 100.00 |
| 175 | 0.00 | 99.90 | -10.00 | 100.00 |
| 180 | 0.00 | 104.17 | -10.00 | 100.00 |
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| Antenna Model | AVL 2.4 meter |
| 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 | -31.5 (dBW/4 kHz) |

| Azimuth (°) | Horizon Elevation (°) | Antenna Discrimination (°) | Transmit 28.0 GHz | |
|-------------|--------------------------|-------------------------------|-----------------------|-------------------------------|
| | | | Horizon Gain (dBi) | Coordination Distance (km) |
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| 200 | 0.00 | 120.84 | -9.56 | 100.00 |
| 205 | 0.00 | 124.82 | -8.97 | 100.00 |
| 210 | 0.00 | 128.69 | -8.25 | 100.00 |
| 215 | 0.00 | 132.41 | -7.40 | 100.00 |
| 220 | 0.00 | 135.94 | -6.40 | 100.00 |
| 225 | 0.00 | 139.23 | -5.23 | 100.00 |
| 230 | 0.00 | 142.21 | -3.85 | 100.00 |
| 235 | 0.00 | 144.80 | -2.23 | 100.00 |
| 240 | 0.00 | 146.92 | -0.26 | 100.00 |
| 245 | 0.00 | 148.46 | 2.16 | 100.00 |
| 250 | 0.00 | 149.33 | 4.69 | 100.00 |
| 255 | 0.00 | 149.47 | 6.40 | 100.00 |
| 260 | 0.00 | 148.89 | 6.02 | 100.00 |
| 265 | 0.00 | 147.61 | 3.89 | 100.00 |
| 270 | 0.00 | 145.71 | 1.33 | 100.00 |
| 275 | 0.00 | 143.29 | -1.05 | 100.00 |
| 280 | 0.00 | 140.46 | -3.13 | 100.00 |
| 285 | 0.00 | 137.28 | -4.94 | 100.00 |
| 290 | 0.00 | 133.84 | -6.52 | 100.00 |
| 295 | 0.00 | 130.19 | -7.91 | 100.00 |
| 300 | 0.00 | 126.38 | -9.16 | 100.00 |
| 305 | 0.00 | 122.44 | -10.00 | 100.00 |
| 310 | 0.00 | 118.39 | -10.00 | 100.00 |
| 315 | 0.00 | 114.27 | -10.00 | 100.00 |
| 320 | 0.00 | 110.09 | -10.00 | 100.00 |
| 325 | 0.00 | 105.86 | -10.00 | 100.00 |
| 330 | 0.00 | 101.60 | -10.00 | 100.00 |
| 335 | 0.00 | 97.31 | -10.00 | 100.00 |
| 340 | 0.00 | 93.01 | -10.00 | 100.00 |
| 345 | 0.00 | 88.70 | -10.00 | 100.00 |
| 350 | 0.00 | 84.40 | -10.00 | 100.00 |
| 355 | 0.00 | 80.10 | -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 |