

Ka-Band Earth Station – Oceanside, CA

Frequency Coordination Report

28 GHz



Prepared on Behalf of
O3b Networks USA, LLC

December 30, 2015





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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 experimental Ka-Band earth station in Oceanside, 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.

As of December 30, 2015, no objections have been 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 LTTTS Coordination

In accordance with FCC Rules and Regulations, the Ka-Band earth station in Oceanside, 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 November 23, 2015. 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	Statewide: California
Verizon	Continental US

A notification letter and datasheets for the Ka-Band earth station in Oceanside, California were also sent to the following 28 GHz local television transmission licensee on November 23, 2015. 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 November 23, 2015. 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	Los Angeles, CA
T-Mobile ²	BTA262	Los Angeles, CA
TelePacific Communications ³	BTA262	Los Angeles, CA
Towerstream Corporation ⁴	BTA262	Los Angeles, CA
EchoStar	BTA402 ⁵	San Diego, CA
Nextlink / XO ⁶	BTA402	San Diego, CA

As of December 30, 2015, finalization of LMDS coordination was pending the response of one or more of the incumbent LMDS licensees.

² T-Mobile has acquired spectrum from Nextlink / XO in the Los Angeles, CA Basic Trading Area (BTA).

³ TelePacific Communications is leasing spectrum from Nextlink / XO in the Los Angeles, CA BTA.

⁴ Towerstream Corporation is leasing spectrum from Nextlink / XO in the Los Angeles, CA BTA.

⁵ The proposed earth station will be located inside BTA402.

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

4. Earth Station Coordination Data

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

Date: 11/20/2015
Job Number: 151120COMSGE04

Administrative Information

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

Site Information

OCEANSIDE, CA
Venue Name
Latitude (NAD 83) 33° 14' 53.5" N
Longitude (NAD 83) 117° 25' 30.7" W
Climate Zone A
Rain Zone 4
Ground Elevation (AMSL) 13.96 m / 45.8 ft

Link Information

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

Antenna Information

		Receive - FCC32		Transmit - FCC32
Manufacturer		AVL		AVL
Model		2.4 meter		2.4 meter
Gain / Diameter		51.3 dBi / 2.4 m		54.7 dBi / 2.4 m
3-dB / 15-dB Beamwidth		0.23° / 0.60°		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz) (dBW/MHz)			-23.5 0.5
Maximum EIRP	(dBW/4 kHz) (dBW/MHz)			31.2 55.2
Interference Objectives:	Long Term Short Term	-156.0 dBW/MHz -146.0 dBW/MHz	20% 0.01%	-151.0 dBW/4 kHz 20% -128.0 dBW/4 kHz 0.0025%

Frequency Information

	Receive 18.0 GHz	Transmit 28.0 GHz
Emission / Frequency Range (MHz)	216MG7D / 17800.0 - 18300.0	216MG7D / 27600.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi	121.9 km / 75.7 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi	100.0 km / 62.1 mi

Coordination Values		OCEANSIDE, CA			
Licensee Name		O3b Networks USA, LLC.			
Latitude (NAD 83)		33° 14' 53.5" N			
Longitude (NAD 83)		117° 25' 30.7" W			
Ground Elevation (AMSL)		13.96 m / 45.8 ft			
Antenna Centerline (AGL)		2.74 m / 9.0 ft			
Antenna Model		AVL 2.4 meter			
Antenna Mode		Receive 18.0 GHz		Transmit 28.0 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		-23.5 (dBW/4 kHz)			

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 18.0 GHz		Transmit 28.0 GHz		Coordination Distance (km)
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)	
0	0.00	76.32	-10.00	100.00	-10.00	100.00	100.00
5	0.00	72.05	-10.00	100.00	-10.00	100.00	100.00
10	0.00	67.83	-10.00	100.00	-10.00	100.00	100.00
15	0.00	63.66	-10.00	100.00	-10.00	100.00	100.00
20	0.00	59.56	-10.00	100.00	-10.00	100.00	100.00
25	0.00	55.54	-10.00	100.00	-10.00	100.00	100.00
30	0.00	51.64	-10.00	100.00	-10.00	100.00	100.00
35	0.00	47.88	-10.00	100.00	-10.00	100.00	100.00
40	0.00	44.30	-10.00	100.00	-10.00	100.00	100.00
45	0.00	40.95	-10.00	100.00	-10.00	100.00	100.00
50	0.00	37.90	-10.00	100.00	-10.00	100.00	100.00
55	0.00	35.23	-10.00	100.00	-10.00	100.00	100.00
60	0.00	33.03	-8.97	100.00	-8.97	100.00	100.00
65	0.00	31.39	-7.68	100.00	-7.68	100.00	100.00
70	0.00	30.42	-6.25	100.00	-6.25	100.00	100.00
75	0.00	30.18	-4.61	100.00	-4.61	100.00	100.00
80	0.00	30.68	-2.70	100.00	-2.70	100.00	100.00
85	0.00	31.90	-0.51	100.00	-0.51	100.00	100.00
90	0.00	33.74	2.00	100.00	2.00	100.00	100.00
95	0.00	36.12	4.92	100.00	4.92	100.00	100.00
100	0.00	38.94	7.29	100.00	7.29	100.00	100.00
105	0.00	42.10	7.45	100.00	7.45	100.00	100.00
110	0.00	45.53	5.22	100.00	5.22	100.00	100.00
115	0.00	49.18	2.32	100.00	2.32	100.00	100.00
120	0.00	53.00	-0.25	100.00	-0.25	100.00	100.00
125	0.00	56.94	-2.24	100.00	-2.24	100.00	100.00
130	0.00	60.99	-3.90	100.00	-3.90	100.00	100.00
135	0.00	65.12	-5.34	100.00	-5.34	100.00	100.00
140	0.00	69.31	-6.51	100.00	-6.51	100.00	100.00
145	0.00	73.55	-7.52	100.00	-7.52	100.00	100.00
150	0.00	77.82	-8.37	100.00	-8.37	100.00	100.00
155	0.00	82.12	-9.09	100.00	-9.09	100.00	100.00
160	0.00	86.44	-9.68	100.00	-9.68	100.00	100.00
165	0.00	90.76	-10.00	100.00	-10.00	100.00	100.00
170	0.00	95.08	-10.00	100.00	-10.00	100.00	100.00
175	0.00	99.39	-10.00	100.00	-10.00	100.00	100.00
180	0.00	103.68	-10.00	100.00	-10.00	100.00	100.00
185	0.00	107.95	-10.00	100.00	-10.00	100.00	100.00

Coordination Values		OCEANSIDE, CA			
Licensee Name		O3b Networks USA, LLC.			
Latitude (NAD 83)		33° 14' 53.5" N			
Longitude (NAD 83)		117° 25' 30.7" W			
Ground Elevation (AMSL)		13.96 m / 45.8 ft			
Antenna Centerline (AGL)		2.74 m / 9.0 ft			
Antenna Model		AVL 2.4 meter			
Antenna Mode		Receive 18.0 GHz		Transmit 28.0 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		-23.5 (dBW/4 kHz)			

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 18.0 GHz		Transmit 28.0 GHz		Coordination Distance (km)
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)	
190	0.00	112.17	-10.00	100.00	-10.00	100.00	100.00
195	0.00	116.34	-10.00	100.00	-10.00	100.00	100.00
200	0.00	120.44	-9.68	100.00	-9.68	100.00	100.00
205	0.00	124.46	-9.09	100.00	-9.09	100.00	100.00
210	0.00	128.36	-8.37	100.00	-8.37	100.00	100.00
215	0.00	132.12	-7.52	100.00	-7.52	100.00	100.00
220	0.00	135.70	-6.51	100.00	-6.51	100.00	100.00
225	0.00	139.05	-5.34	100.00	-5.34	100.00	100.00
230	0.00	142.10	-3.97	100.00	-3.97	100.00	100.00
235	0.00	144.77	-2.35	100.00	-2.35	100.00	100.00
240	0.00	146.97	-0.39	100.00	-0.39	100.00	100.00
245	0.00	148.61	2.04	100.00	2.04	106.50	106.50
250	0.00	149.58	4.70	100.00	4.70	115.60	115.60
255	0.00	149.82	6.69	100.00	6.69	121.90	121.90
260	0.00	149.32	6.57	100.00	6.57	121.50	121.50
265	0.00	148.10	4.44	100.00	4.44	114.70	114.70
270	0.00	146.26	1.78	100.00	1.78	105.60	105.60
275	0.00	143.88	-0.69	100.00	-0.69	100.00	100.00
280	0.00	141.06	-2.84	100.00	-2.84	100.00	100.00
285	0.00	137.90	-4.70	100.00	-4.70	100.00	100.00
290	0.00	134.47	-6.32	100.00	-6.32	100.00	100.00
295	0.00	130.82	-7.74	100.00	-7.74	100.00	100.00
300	0.00	127.00	-9.01	100.00	-9.01	100.00	100.00
305	0.00	123.06	-10.00	100.00	-10.00	100.00	100.00
310	0.00	119.01	-10.00	100.00	-10.00	100.00	100.00
315	0.00	114.88	-10.00	100.00	-10.00	100.00	100.00
320	0.00	110.69	-10.00	100.00	-10.00	100.00	100.00
325	0.00	106.45	-10.00	100.00	-10.00	100.00	100.00
330	0.00	102.18	-10.00	100.00	-10.00	100.00	100.00
335	0.00	97.88	-10.00	100.00	-10.00	100.00	100.00
340	0.00	93.56	-10.00	100.00	-10.00	100.00	100.00
345	0.00	89.24	-10.00	100.00	-10.00	100.00	100.00
350	0.00	84.92	-10.00	100.00	-10.00	100.00	100.00
355	0.00	80.61	-10.00	100.00	-10.00	100.00	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

INTERFERENCE ANALYSIS REPORT

Prepared for
O3b Networks USA, LLC.
OCEANSIDE, CA
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
December 28, 2015



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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 18 GHz 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.

The following companies reported potential great circle interference conflicts that did not meet the objectives on a line-of-sight basis. When over-the-horizon losses are considered on the interfering paths, sufficient blockage exists to negate harmful interference from occurring with the proposed transmit-receive earth station.

Company

New Cingular Wireless PCS LLC -San Diego
Nextel of California Inc.
T-Mobile License LLC

No other carriers reported potential interference cases.

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 11/20/2015.

Company

AT&T Corporation
AirSites2000, LLC
Anaheim City, of
Antilles Wireless, LLC
BP West Coast Products LLC
Bahia Hotel
Bel Air Internet, LLC
CARITAS TELECOMMUNICATIONS
CCS Wireless, Inc.
California Internet Solutions, Inc.
California, State of
City of Irvine Public Safety
City of Newport Beach
City of Oceanside
City of Poway
City of Riverside
City of San Bernardino, MWD
City of Whittier
Clearwire Spectrum Holdings III, LLC
Conterra Ultra Broadband, LLC
Corona, City of, Dept of Water & Power
DRS Technical Services
Disneyland Resort
EASTERN MUNICIPAL WATER DISTRICT
Embee Technologies
Energia Costa Azul S. de R.L. de C.V.
Fireline Network Solutions Inc.
Foothill Transit
Global Telecom & Technology Americas
Inland Empire Utilities Agency
International Communications Network Inc
LEMON GROVE SCHOOL DISTRICT
LT-WR, LLC
Lightwave Broadband LLC
Long Beach City California
Long Beach City Electronics Div.
Los Angeles City Info Technology Agency
Los Angeles County Dept of Public Works
Los Angeles County FCC Licensing Section
Los Angeles County Metro Transit Auth

Los Angeles Regional Interoperable Comm
Los Angeles SMSA Ltd. Partnership
MEXICO UNITED MEXICAN STATES
MHO Networks
MOBILE RELAY ASSOCIATES INC
Mark Hopperton
MetroConnect Inc
Metropolitan Water Dist of So California
Moreno Valley City California
Moulton Niguel Water District
New Cingular Wireless PCS - Los Angeles
New Cingular Wireless PCS LLC - N CAL
New Cingular Wireless PCS LLC -San Diego
Nextel of California Inc.
Nextlink Wireless, LLC
Nextweb Inc
Olympic Wireless, LLC
Pacific Bell Tel Com dba AT&T California
Palomar Broadband
Pomona College - KSPC
QUALCOMM INC.
Quest Diagnostics Incorporated
Regents of the University of California
Regents of the University of California
Regional 3Cs
SAN DIEGO UNIVERSITY
ST. JOSEPH HEALTH SYSTEM
San Bernardino County of California
San Diego Broadband
San Diego Gas & Electric Company
San Diego Unified School District
San Diego, City of
San Diego, County of
Santa Fe Irrigation District
Santa Margarita Water District
Scripps Media, Inc. - KGTV
Sempra Global
Sky Valley Network LLC
Skyriver Communications
Southern California Edison Company
Southern California Gas Company
Southern California Telephone Company
Sprint Telephony PCS, L.P.
Sprintcom, Inc. Puerto Rico
Sweetwater Authority
T-MOBILE LIC LLC - VOICESTREAM PCS BTA I
T-Mobile License LLC
THUMS Long Beach Company
Tesoro Companies, Inc
Time Warner Cable Pacific West LLC
Towerstream Corp.
Trango Systems, Inc.
Turn Wireless, LLC
Ultimate Internet Access, Inc
Union Pacific Railroad Company
Vectus, Inc

Verizon California Inc.
Verizon Wireless (VAW) LLC (Southern CA)
WEST COVINA, CITY OF
WEST END COMMUNICATIONS AUTHORITY
WT Consulting Group, LLC
Walnut Valley Water District
Webpass Inc.
Western Municipal Water District
White, Fred K
WiLogic, Inc
Wiline Spectrum Holdings LLC
Zray Technologies Inc.

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: 12/28/2015
Job Number: 151120COMSGE04

Administrative Information

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

Site Information OCEANSIDE, CA

Venue Name
Latitude (NAD 83) 33° 14' 53.5" N
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Climate Zone A
Rain Zone 4
Ground Elevation (AMSL) 13.96 m / 45.8 ft

Link Information

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

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		Receive - FCC32		Transmit - FCC32	
Manufacturer		AVL		AVL	
Model		2.4 meter		2.4 meter	
Gain / Diameter		51.3 dBi / 2.4 m		54.7 dBi / 2.4 m	
3-dB / 15-dB Beamwidth		0.23° / 0.60°		0.14° / 0.32°	
Max Available RF Power	(dBW/4 kHz) (dBW/MHz)			-23.5 0.5	
Maximum EIRP	(dBW/4 kHz) (dBW/MHz) (dBW)			31.2 55.2	
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 18.0 GHz	Transmit 28.0 GHz
Emission / Frequency Range (MHz)	216MG7D / 17800.0 - 18300.0	216MG7D / 27600.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi	121.9 km / 75.7 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

OCEANSIDE, CA

Licensee Name O3b Networks USA, LLC.
Latitude (NAD 83) 33° 14' 53.5" N
Longitude (NAD 83) 117° 25' 30.7" W
Ground Elevation (AMSL) 13.96 m / 45.8 ft
Antenna Centerline (AGL) 2.74 m / 9.0 ft
Antenna Model AVL 2.4 meter
Antenna Mode Receive 18.0 GHz Transmit 28.0 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 -23.5 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 18.0 GHz		Transmit 28.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	76.32	-10.00	100.00	-10.00	100.00
5	0.00	72.05	-10.00	100.00	-10.00	100.00
10	0.00	67.83	-10.00	100.00	-10.00	100.00
15	0.00	63.66	-10.00	100.00	-10.00	100.00
20	0.00	59.56	-10.00	100.00	-10.00	100.00
25	0.00	55.54	-10.00	100.00	-10.00	100.00
30	0.00	51.64	-10.00	100.00	-10.00	100.00
35	0.00	47.88	-10.00	100.00	-10.00	100.00
40	0.00	44.30	-10.00	100.00	-10.00	100.00
45	0.00	40.95	-10.00	100.00	-10.00	100.00
50	0.00	37.90	-10.00	100.00	-10.00	100.00
55	0.00	35.23	-10.00	100.00	-10.00	100.00
60	0.00	33.03	-8.97	100.00	-8.97	100.00
65	0.00	31.39	-7.68	100.00	-7.68	100.00
70	0.00	30.42	-6.25	100.00	-6.25	100.00
75	0.00	30.18	-4.61	100.00	-4.61	100.00
80	0.00	30.68	-2.70	100.00	-2.70	100.00
85	0.00	31.90	-0.51	100.00	-0.51	100.00
90	0.00	33.74	2.00	100.00	2.00	100.00
95	0.00	36.12	4.92	100.00	4.92	100.00
100	0.00	38.94	7.29	100.00	7.29	100.00
105	0.00	42.10	7.45	100.00	7.45	100.00
110	0.00	45.53	5.22	100.00	5.22	100.00
115	0.00	49.18	2.32	100.00	2.32	100.00
120	0.00	53.00	-0.25	100.00	-0.25	100.00
125	0.00	56.94	-2.24	100.00	-2.24	100.00
130	0.00	60.99	-3.90	100.00	-3.90	100.00
135	0.00	65.12	-5.34	100.00	-5.34	100.00
140	0.00	69.31	-6.51	100.00	-6.51	100.00
145	0.00	73.55	-7.52	100.00	-7.52	100.00
150	0.00	77.82	-8.37	100.00	-8.37	100.00
155	0.00	82.12	-9.09	100.00	-9.09	100.00
160	0.00	86.44	-9.68	100.00	-9.68	100.00
165	0.00	90.76	-10.00	100.00	-10.00	100.00
170	0.00	95.08	-10.00	100.00	-10.00	100.00
175	0.00	99.39	-10.00	100.00	-10.00	100.00
180	0.00	103.68	-10.00	100.00	-10.00	100.00
185	0.00	107.95	-10.00	100.00	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

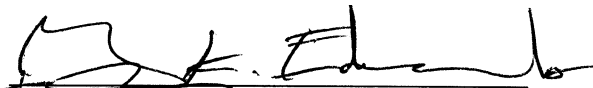
OCEANSIDE, CA

Licensee Name	O3b Networks USA, LLC.			
Latitude (NAD 83)	33° 14' 53.5" N			
Longitude (NAD 83)	117° 25' 30.7" W			
Ground Elevation (AMSL)	13.96 m / 45.8 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	AVL 2.4 meter			
Antenna Mode	Receive 18.0 GHz		Transmit 28.0 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			-23.5 (dBW/4 kHz)	

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 18.0 GHz		Transmit 28.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	112.17	-10.00	100.00	-10.00	100.00
195	0.00	116.34	-10.00	100.00	-10.00	100.00
200	0.00	120.44	-9.68	100.00	-9.68	100.00
205	0.00	124.46	-9.09	100.00	-9.09	100.00
210	0.00	128.36	-8.37	100.00	-8.37	100.00
215	0.00	132.12	-7.52	100.00	-7.52	100.00
220	0.00	135.70	-6.51	100.00	-6.51	100.00
225	0.00	139.05	-5.34	100.00	-5.34	100.00
230	0.00	142.10	-3.97	100.00	-3.97	100.00
235	0.00	144.77	-2.35	100.00	-2.35	100.00
240	0.00	146.97	-0.39	100.00	-0.39	100.00
245	0.00	148.61	2.04	100.00	2.04	106.50
250	0.00	149.58	4.70	100.00	4.70	115.60
255	0.00	149.82	6.69	100.00	6.69	121.90
260	0.00	149.32	6.57	100.00	6.57	121.50
265	0.00	148.10	4.44	100.00	4.44	114.70
270	0.00	146.26	1.78	100.00	1.78	105.60
275	0.00	143.88	-0.69	100.00	-0.69	100.00
280	0.00	141.06	-2.84	100.00	-2.84	100.00
285	0.00	137.90	-4.70	100.00	-4.70	100.00
290	0.00	134.47	-6.32	100.00	-6.32	100.00
295	0.00	130.82	-7.74	100.00	-7.74	100.00
300	0.00	127.00	-9.01	100.00	-9.01	100.00
305	0.00	123.06	-10.00	100.00	-10.00	100.00
310	0.00	119.01	-10.00	100.00	-10.00	100.00
315	0.00	114.88	-10.00	100.00	-10.00	100.00
320	0.00	110.69	-10.00	100.00	-10.00	100.00
325	0.00	106.45	-10.00	100.00	-10.00	100.00
330	0.00	102.18	-10.00	100.00	-10.00	100.00
335	0.00	97.88	-10.00	100.00	-10.00	100.00
340	0.00	93.56	-10.00	100.00	-10.00	100.00
345	0.00	89.24	-10.00	100.00	-10.00	100.00
350	0.00	84.92	-10.00	100.00	-10.00	100.00
355	0.00	80.61	-10.00	100.00	-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: December 28, 2015