REQUEST FOR SPECIAL TEMPORARY AUTHORITY

O3b Limited ("O3b"), pursuant to Section 25.120 of the Commission's rules, hereby respectfully requests special temporary authority ("STA") to operate an earth station to be located at the Naval Aviation (NAVAIR) Special Communications Requirements (SCR) Division in St. Inigoes, Maryland ("St. Inigoes Earth Station") that will communicate with the satellite system operated by O3b.[1] In this filing, O3b seeks a 30-day STA for the period between November 24, 2014 and December 24, 2014.[2]

The St. Inigoes Earth Station will be used for non-commercial testing and demonstration purposes. The St. Inigoes Earth Station will simulate potential applications of the O3b satellite system, including interactive video teleconferencing, interactive access to complex web content from the Internet and very large file transfers. As discussed below, grant of the requested authority is in the public interest as it will allow O3b to test and evaluate O3b services that could benefit the U.S. Department of Defense.

Test Details and Public Interest Showing

The St. Inigoes Earth Station will communicate with O3b's UK-authorized, Ka-band, Medium Earth Orbit, non-geostationary satellite orbit ("NGSO") Fixed-Satellite Service ("FSS") system[3] and O3b's gateway earth station in Vernon, TX.[4]

The frequencies to be used by the St. Inigoes Earth Station are:

- 27.6-28.4 GHz, 28.6-29.1 GHz (uplink)
- 17.8-18.6 GHz, 18.8-19.3 GHz (downlink)

The St. Inigoes Earth Station will consist of two (2) 1.2m Orbit antennas. O3b has previously been granted an STA to operate this earth station at the CODA Lab location in San Diego, California[5] and has requested STAs to operate the earth station at the Data Technology Solution ("DTS") facility in Breaux Bridge, Louisiana,[6] at Oil Comm 2014,[7] and at a U.S. Department of Defense facility at Ft. Belvoir, VA.[8]

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[1] Although the St. Inigoes Earth Station will be located at a U.S. government facility during the term of the STA, it will be operated and controlled by O3b.

[2] O3b notes that it is concurrently filing herewith a second STA request for an additional 180 days to continue operation of the subject facility from December 25, 2014.

[3] O3b's first four satellites were launched on June 25, 2013. O3b's next batch of four satellites was launched on July 10, 2014.

[4] *See* O3b Limited, Call Sign E130021, File No. SES-LIC-20130124-00089, granted June 20, 2013 ("O3b Texas License").

[5] *See* O3b Limited, File No. SES-STA-20131228-01209, filed Dec. 23, 2013 ("O3b CODA STA Application"), and which was placed on Public Notice on April 2, 2014 and granted on April 29, 2014.

[6] *See* O3b Limited, File No. SES-STA-20140731-00627, filed July 31, 2014 ("O3b DTS STA Application").

[7] *See* O3b Limited, File No. SES-STA-20140819-00666, filed Aug. 19, 2014 ("O3b Oil Comm STA Application").

[8] *See* O3b Limited, File No. SES-STA-20140903-00686, filed Sep. 3, 2014 ("O3b Ft. Belvoir STA Application").

The St. Inigoes Earth Station antennas will be mounted on a temporary fixed platform. Although the pointing angle of the antennas will change as O3b's in-orbit satellites are tracked, the platform will remain stationary during the demonstration.

Grant of this application will serve the public interest, convenience and necessity by allowing O3b to show how its system can effectively deliver high bandwidth network connectivity to Department of Defense facilities and employees. O3b will demonstrate the advantages of its system's high throughput and low latency for providing a variety of valuable communications services, including voice, data transfers and video conferencing using connected devices.

The O3b Satellite System

In its initial FCC application, which sought authority for a gateway earth station located in Hawaii, O3b stated that it planned to operate eight NGSO satellites that would be spaced equally, *i.e.,* at 45° intervals.[9] The Commission granted this application.[10]

O3b has filed an application seeking to modify its Hawaii license to give it the flexibility to operate up to two of its eight NGSO satellites as in-orbit spares.[11] The remaining satellites would be equally spaced in O3b's authorized orbital plane, and each in-orbit spare would be co-located with a non-spare satellite.[12] O3b has been granted an STA pending action on its modification application.[13]

Earth Station Technical Parameters

The following documents containing technical details of the operations proposed under the requested STA are attached:

- Annex 1: FCC Form 312, Schedule B. O3b proposes to operate the St. Inigoes Earth Station during this 30-day term in accordance with the parameters specified in the attached Schedule B.[14]
- Annex 2: Link Budgets. Representative links for the St. Inigoes Earth Station are provided.
- Annex 3: Characteristics of the 1.2m Orbit Antenna are provided for the Commission's convenience. O3b previously submitted this information to the Commission.[15]

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[9] *See* Application for Hawaii Earth Station, File No. SES-LIC-20100723-00952, Legal Narrative, Section III and Attachment A thereto (Technical Statement), Section A.2.

[10] *See* O3b Limited, Call Sign E100088, File No. SES-LIC-20130124-00089, granted Sept. 25, 2012 ("O3b Hawaii License").

[11] *See* O3b Limited, Call Sign E100088, File No. SES-STA-20140814-00656. *See also* O3b Limited, Call Sign E100088, File No. SES-MOD-20140814-00652.

[12] No changes were sought to the technical parameters identified in the licenses and STAs held by O3b and its customers. No changes were made to O3b's Schedule S, either, but O3b noted that the number of satellites and phase angles in Section S4 and S5 of Schedule S will vary to the extent that O3b operates one or more in-orbit spare satellites.

[13] *See* O3b Limited, Call Sign E100088, File No. SES-STA-20140814-00656.

[14] Although O3b is not seeking a regular license for the St. Inigoes Earth Station, O3b is providing a Schedule B containing technical parameters for the Commission's convenience.

- Annex 4: Comsearch Reports. Comsearch Reports are provided for bands in which terrestrial frequencies have primary allocations. Comsearch notified operators within a coordination zone calculated using the ITU RR Appendix 7 guidelines.
    - 27.6-28.35 GHz band. As stated in the attached Frequency Coordination Report, Comsearch has notified all existing and proposed LMDS licensees that are within the coordination contours of the St. Inigoes Earth Station and that potentially could be affected by O3b's transmissions in the 27.6-28.35 GHz portion of the Ka-band. No objections were received from any of these parties.
    - 18.3-18.6 GHz band. As stated in the attached Interference Analysis Report, for operations in the 18.3-18.6 GHz band, the St. Inigoes Lab Earth Station will operate satisfactorily within the 18 GHz microwave environment, and there will be no restrictions of its operation due to interference considerations.

Further, O3b incorporates by reference the following technical parameters previously provided by O3b:

- Schedule S. In its application for a gateway earth station in Hawaii, O3b submitted a Schedule S describing its satellite system's technical characteristics.[16] The Schedule S correctly described the O3b satellite system for that application, and numerically enveloped all of the necessary parameters for future earth station applications. In order to assist the Commission in processing present and future applications, O3b subsequently provided a modified Schedule S that incorporates additional information submitted to the Commission since the Hawaii application was filed.[17] O3b will operate its St. Inigoes Earth Station within the parameters described in O3b's modified Schedule S.
- U.S. Government Coordination. O3b has completed all necessary coordination with U.S. government satellite networks operating in Ka-band, including GSO and NGSO networks, as well as their associated specific earth stations filed under 9.7A and 9.7B of the ITU Radio Regulations through other administrations. O3b has also completed coordination, according to US footnote 334 of the FCC table of frequency allocations, with the U.S. government, and this US334 coordination agreement specifically provides for additional earth stations in U.S. territory operating with O3b's satellites, such as the St. Inigoes Earth Station. As a result, O3b's existing US334 coordination agreement covers the use of the St. Inigoes Earth Station as requested in this application.

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[15] *See* O3b blanket maritime earth station application, File No. SES-LIC-20130528-00455, Technical Attachment at A.6. *See also* O3b DTS STA Application; O3b Oil Comm STA Application.

[16] *See* O3b Limited, Call Sign E100088, File No. SES-LIC-20100723-00952, granted Sept. 25, 2012 ("O3b Hawaii License").

[17] *See* O3b Limited, Call Sign E130098, File No. SES-AMD-20131025-01138 ("O3b ESV Answers").

- Antenna Patterns. O3b previously submitted measured 30 GHz band antenna performance data for the 1.2m Orbit antenna to the Commission in the Coda Lab STA request[18] and the pending DTS and Oil Comm STA requests.[19]

Proposed Spectrum Use

O3b's proposed St. Inigoes Earth Station operations in shared bands are consistent with the Commission's rules and policies. O3b addresses each of these bands below.

UPLINK

27.6-28.35 GHz – Secondary uplink band shared with primary LMDS.

The 27.6-28.35 GHz uplink band is allocated to the local multipoint distribution service ("LMDS") on a primary basis. FSS operations are allocated on a secondary basis in the same band. Accordingly, O3b's proposed operations in this band must not cause harmful interference to primary LMDS stations.

The attached Comsearch coordination report demonstrates that O3b can operate its St. Inigoes Earth Station on a secondary basis in this band without causing harmful interference to LMDS licensees. Comsearch sent a coordination notice to all existing and proposed terrestrial licensees within the Comsearch coordination contours of the St. Inigoes Earth Station site. No objections were received from any of the incumbent licensees.

28.35-28.4 GHz – Secondary uplink band shared with primary GSO FSS stations.

In the 28.35-28.4 GHz band, there is a primary allocation for GSO FSS systems and a secondary allocation for NGSO FSS systems. O3b's St. Inigoes Earth Station transmissions in this band will be consistent with their secondary status vis-à-vis GSO FSS transmissions. The Commission has allowed similar secondary use of frequencies in the Ka-band uplink allocated to GSO FSS on a primary basis where applicants are prepared to accept interference from primary operations and can demonstrate that their proposed operations are not likely to cause harmful interference to primary operations.[20] O3b agrees to both of these standards.

As a secondary user of the 28.35-28.4 GHz band in the United States, O3b makes no claim of protection from interference from U.S.-licensed GSO FSS networks in this band segment. As for O3b's uplink operations in the 28.35-28.4 GHz band, the ITU has developed uplink equivalent power flux density limits ("$EPFD_{up}$") limits to protect co-frequency GSO FSS operations from unacceptable interference from NGSO FSS systems operating in the same frequencies. Specifically, in accordance with

[18] *See* O3b Limited, File No. SES-STA-20131228-01209, filed December 23, 2013 ("O3b CODA STA Application"), and which was placed on Public Notice on April 2, 2014 and granted on April 29, 2014.
[19] *See* O3b DTS STA Application. *See also* O3b Oil Comm STA Application.
[20] *Northrop Grumman Space & Missions Systems Corporation*, 24 FCC Rcd 2330, at ¶¶ 72-73 (Int'l Bur. 2009); *contactMEO Communications*, LLC, 21 FCC Rcd 4035, at ¶¶ 23-24, (Int'l Bur., 2006).

Article 22 of the ITU Radio Regulations, if the applicable $EPFD_{up}$ limits are met, the NGSO FSS satellite system is considered to have met its obligations to protect GSO FSS networks from unacceptable interference. O3b demonstrated that its gateway located at Hawaii operating at the authorized power levels will meet the applicable ITU $EPFD_{up}$ limits in all frequency ranges where these limits apply, due to the inherent angular separation between the O3b and geostationary orbits when viewed from the Earth at latitudes away from the equator.[21]

The St. Inigoes Earth Station is located further north in latitude than the Hawaii gateway,[22] which results in an even greater angular separation between the O3b and geostationary orbits as viewed from the Earth and an even greater assurance that the applicable ITU $EPFD_{up}$ limits will be met by O3b's proposed operations. The proposed St. Inigoes Earth Station operations, therefore, also will meet the applicable ITU $EPFD_{up}$ limits. In any event, O3b confirms that its operations will be on a secondary basis relative to U.S.-licensed GSO FSS networks in the same band.

28.6-29.1 GHz – Primary uplink band for licensed NGSO FSS Systems.

Under the Commission's Ka-band frequency plan, the frequencies 28.6-29.1 GHz may be used on a primary basis by licensed NGSO FSS systems.[23] O3b recognizes, however, that operations under an STA for the St. Inigoes Earth Station demonstrations will be on a secondary, non-harmful interference basis. As shown below, the St. Inigoes Earth Station demonstrations will provide the requisite protection to allocated services operating in this band.

Avoidance of interference to GSO FSS systems. The proposed demonstrations will not cause any interference into, or require protection from, any co-frequency GSO satellites. As previously shown,[24] there is an inherent angular separation between the O3b and GSO arcs from the perspective of earth stations located away from the equator. The St. Inigoes Earth Station is located further north in latitude than the Hawaii gateway,[25] which results in an even greater angular separation between the O3b and geostationary orbits as viewed from the Earth. This means that the angular separation between the O3b and GSO arcs from the St. Inigoes Earth Station will be greater than the 7 degree separation accepted by the Commission when it approved O3b's Hawaii gateway. This ensures that GSO FSS systems will be adequately protected.

Avoidance of interference to or from Fixed Service (i.e., terrestrial) stations. Interference from the O3b St. Inigoes Earth Station transmissions into U.S. terrestrial Fixed Service ("FS") receivers in the

[21] O3b Hawaii License Application, FCC File No. SES-LIC-20100723-00952, Technical Attachment at A.10.1.
[22] The O3b Hawaii gateway latitude is 21° 40' 17.8" N; the St. Inigoes Earth Station latitude is 38° 8' 23.3" N.
[23] *See In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, 11 FCC Rcd. 19005, ¶¶59-62 and 79 (1996). *See also In the Matter of Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, 15 FCC Rcd 13430, ¶ 28 (2000).
[24] O3b Hawaii License Application, FCC File No. SES-LIC-20100723-00952, Technical Attachment at A.10.1.
[25] *See* n. 22, *supra*.

28 GHz band is a non-issue because there is no allocation in the Commission's Ka-band Frequency Plan for FS stations operating in the 28.6-29.1 GHz band in the United States.[26]

DOWNLINK

17.8-18.3 GHz – Primary downlink band for licensed FS Systems.

This frequency band is allocated on a primary basis to FS, and there is no secondary allocation for NGSO FSS in the band. Accordingly, O3b requests a waiver of the Ka-Band Plan and Section 2.106 of the Commission's rules to permit O3b to operate its NGSO FSS system in the 17.8-18.3 GHz band for downlink operations on a non-conforming, non-interference basis. As noted above, in analyzing requests for non-conforming spectrum uses, the Commission has indicated it will generally grant such waivers where there is not potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from allocated services.

In this case, O3b's proposed non-conforming use of the 17.8-18.3 GHz frequency band for downlink operations will not cause harmful interference to FS operations in the same band. This is because O3b will meet the PFD limits at the earth's surface prescribed by the ITU for the protection of terrestrial services in this band. In addition, as a non-conforming user, O3b will accept interference from FS operations in the band.

In addition, an Interference Analysis Report from Comsearch and O3b's own analysis indicate that there will be no restrictions of O3b's operations due to interference considerations.

In light of the foregoing, a waiver of Section 2.106 of the Commission's rules and the Ka-Band Plan is warranted because no harmful interference will result to incumbent FS operations, O3b can operate satisfactorily within the 18 GHz microwave environment, and the public interest is otherwise served by permitting O3b to demonstrate its satellite services to the U.S. military.

18.3-18.6 GHz – Non-conforming downlink band shared with primary GSO FSS stations.

The 18.3-18.6 GHz band is allocated in the United States on a primary basis to GSO FSS. In the 18.3-18.6 GHz downlink band, the ITU has developed downlink equivalent power flux density ("$EPFD_{down}$") limits to protect GSO FSS networks from unacceptable interference from NGSO FSS systems operating in the same frequencies. Specifically, in accordance with Article 22 of the ITU Radio Regulations, if the applicable $EPFD_{down}$ limits are met, the NGSO FSS satellite system is considered to have met its obligations to protect GSO FSS networks from unacceptable interference. O3b confirms that its system will meet the applicable ITU $EPFD_{down}$ limits in all frequency ranges where these limits apply.[27]

[26] *See In the Matter of Verizon Washington D.C., Application for Renewal of License for Common Carrier Fixed Point to Point Microwave Station KGC79*, 26 FCC Rcd 13511, 13516 (WTB 2011).

[27] *See* ITU Radio Regulations, Article 22. *See also* O3b Hawaii License Application, FCC File No. SES-LIC-20100723-00952, Technical Attachment at A.10.1 for a discussion of O3b's compliance with the operational limits in Article

As an example of how these limits will be satisfied, O3b provided $EPFD_{down}$ calculations for transmissions to its Hawaii gateway earth station.[28] O3b also showed how the $EPFD_{down}$ limits can be satisfied at all latitudes.[29] Compliance with the $EPFD_{down}$ limits is even more easily achieved in the case of transmissions to O3b's St. Inigoes Earth Station than it is in the case of transmissions to O3b's Hawaii earth station. O3b is able to satisfy the limits by taking advantage of the inherent angular separation of the O3b and the GSO orbits when viewed from the surface of the Earth at latitudes away from the equator,[30] and O3b's St. Inigoes Earth Station will be located further from the equator than O3b's Hawaii earth station. The St. Inigoes Earth Station location, therefore, presents a strong case for non-interference to GSO FSS networks.

18.8-19.3 GHz – Primary downlink band for licensed NGSO FSS Systems.

Under the Commission's Ka-band frequency plan, the frequencies 18.8-19.3 GHz may be used on a primary basis by licensed NGSO FSS systems.[31] O3b recognizes, however, that operations under an STA for the St. Inigoes Earth Station demonstrations will be on a secondary, non-harmful interference basis. The St. Inigoes Earth Station demonstrations will provide the requisite protection to GSO FSS networks and terrestrial stations operating in this band.

Avoidance of interference to GSO FSS systems. This band is not allocated for GSO FSS networks.[32] Nevertheless, the proposed demonstrations will not cause any interference into, or require protection from, any co-frequency GSO satellites. As previously shown,[33] there is an inherent angular separation between the O3b and GSO arcs from the perspective of earth stations located away from the equator. As mentioned above, the St. Inigoes Earth Station is located further north in latitude than the Hawaii gateway, which results in an even greater angular separation between the O3b and geostationary orbits as viewed from the Earth. This means that the angular separation between the O3b and GSO arcs from the St. Inigoes Earth Station will be greater than the 7 degree separation accepted by the Commission when it approved O3b's Hawaii gateway. This ensures that GSO FSS systems will be adequately protected.

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22 of the ITU Radio Regulations. *See* also Letter from Brian D. Weimer, to Marlene H. Dortch, in re O3b Application for Hawaii Earth Station, File No. SES-LIC-20100723-00952 (Apr. 22, 2011), Annex A.

[28] O3b Hawaii License Application, FCC File No. SES-LIC-20100723-00952, Technical Attachment at A.10.1.

[29] *See* id.

[30] *See* id.

[31] *See In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, 11 FCC Rcd. 19005, ¶¶59-62 and 79 (1996). *See also In the Matter of Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, 15 FCC Rcd 13430, ¶ 28 (2000).

[32] *See* id.

[33] O3b Hawaii License Application, FCC File No. SES-LIC-20100723-00952, Technical Attachment at A.10.1.

However, because the demonstrations O3b proposes in this STA request will be conducted on a secondary basis, O3b agrees to accept any interference that its St. Inigoes Earth Station may receive from 18.8-19.3 GHz band GSO FSS networks

Avoidance of interference to or from Fixed Service (i.e., terrestrial) stations. FS stations operating in the 18.8-19.3 GHz band are no longer co-primary with FSS users in this band.[34] However, because the demonstrations O3b proposes in this STA request will be conducted on a secondary basis, O3b agrees to accept any interference that its St. Inigoes Earth Station may receive from 18.8-19.3 GHz band FS stations. O3b will protect the 18.8-19.3 GHz band FS stations by complying with the space station PFD limits specified in Section 25.208 of the FCC rules.

Conclusion

The requested STA will allow O3b to evaluate and demonstrate the O3b system's operational capabilities and will not result in harmful interference to other authorized spectrum users. Accordingly, and for good cause shown, O3b respectfully requests that its STA be granted in time for it to commence testing under this 30-day STA on November 24, 2014.

[34] *See* 47 C.F.R. § 101.85(b)(2).

ANNEX 1 – Form 312, Schedule B

The Form 312, Schedule B is provided on the following pages.

SATELLITE EARTH STATION AUTHORIZATIONS
FCC Form 312 - Schedule B:(Technical and Operational Description)

Location of Earth Station Site

E1: Site Identifier:	Naval Aviation (NAVAIR) Special Communications Requirements (SCR) Division		E5. Call Sign: N/A
E2: Contact Name:	Bill Jago	E6. Phone Number: 301-995-8034	
E3. Street:	17100 Webster Field Road	E7. City: St. Inigoes	
		E8. County: St. Mary's	
E4. State	MD	E9. Zip Code: 20684	
E10. Area of Operation:	Fixed		
E11. Latitude:	38° 8′ 23.3″ N		
E12. Longitude:	76° 25′ 43.7″ W		
E13. Lat/Lon Coordinates are:		○ NAD-27	◉ NAD-83
E14. Site Elevation (AMSL):	3.26 meters		N/A

E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide a technical analysis showing compliance with two-degree spacing policy.	Yes No ◉ N/A
E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements?	◉ Yes No N/A
E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	○ Yes ◉ No
E18. Is frequency coordination required? If YES, attach a frequency coordination report as	◉ Yes No
E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as	○ Yes ◉ No
E20. FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and or the FAA's study regarding the potential hazard of the structure to aviation? **FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.**	○ Yes ◉ No

POINTS OF COMMUNICATION

Satellite Name:O3B-A | O3B-A | Eq. NGSO If you selected OTHER, please enter the following:	
E21. Common Name:	E22. ITU Name:
E23. Orbit Location:	E24. Country:

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier:

E26. Common Name:	E27. Country:

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size	E41/42. Antenna Gain Transmit and/or Receive (___dBi at_____GHz)
NAVAIR/St Inigoles	Orbit 1.2m	2	Orbit Communications	AL-7103-Ka	1.2	45 dBi at 19.2
						48.0 dBi at 28.3 GHz

E28. Antenna Id	E33/34. Diameter Minor/Major(meters)	E35. Above Ground Level (meters)	E36. Above Sea Level (meters)	E37. Building Height Above Ground Level (meters)	E38. Total Input Power at antenna flange (Watts)	E39. Maximum Antenna Height Above Rooftop (meters)	E40. Total EIRP for al carriers (dBW)
Orbit 1.2m	1.2/1.2	2	75	0.0	20.0	2.0	60.5

FREQUENCY

E28. Antenna Id	E43/44. Frequency Bands(MHz)	E45. T/R Mode	E46. Antenna Polarization(H,V,L,R)	E47. Emission Designator	E48. Maximum EIRP per Carrier(dBW)	E49. Maximum EIRP Density per Carrier(dBW/4kHz)
Orbit 1.2m	17852 - 18588	R	Left and Right Circular	216MG7D	45.6	-1.7
E50. Various Modulations up to 32APSK; Digital Data Link						
Orbit 1.2m	17852 - 18588	R	Left and Right Circular	54MG7D	45.6	4.3
E50. Various Modulations up to 32APSK; Digital Data Link						
Orbit 1.2m	18800 - 19300	R	Left and Right Circular	216MG7D	45.6	-1.7
E50. Various Modulations up to 32APSK; Digital Data Link						
Orbit 1.2m	18800 - 19300	R	Left and Right Circular	54MG7D	45.6	4.3
E50. Various Modulations up to 32APSK; Digital Data Link						
Orbit 1.2m	27652 - 28388	T	Left and Right Circular	216MG7D	60.6	13.3
E50. Various Modulations up to 32APSK; Digital Data Link						
Orbit 1.2m	27652 - 28388	T	Left and Right Circular	54MG7D	60.6	19.3
E50. Various Modulations up to 32APSK; Digital Data Link						

Orbit 1.2m	28600 - 29100	T	Left and Right Circular	216MG7D	60.6	12.3
E50. Various Modulations up to 32APSK; Digital Data Link						
Orbit 1.2m	28600 - 29100	T	Left and Right Circular	54MG7D	60.6	19.3
E50. Various Modulations up to 32APSK; Digital Data Link						

FREQUENCY COORDINATION

E28. Antenna Id	E51. Satellite Orbit Type	E52/53. Frequency Limits(MHz)	E54/55. Range of Satellite Arc E/W Limit	E56. Earth Station Azimuth Angle Eastern Limit	E57. Antenna Elevation Angle Eastern Limit	E58. Earth Station Azimuth Angle Western Limit	E59. Antenna Elevation Angle Western Limit	E60. Maximum EIRP Density toward the Horizon(dBW/4kHz)
Orbit 1.2	Non-Geostationary	17852 - 18588	NON-GEO	140	20.0	230	10	--
Orbit 1.2	Non-Geostationary	18800 - 19300	NON-GEO	140	20.0	230	10	--
Orbit 1.2	Non-Geostationary	27652 - 28388	NON-GEO	140	20.0	230	10	-39.8
Orbit 1.2	Non-Geostationary	28600 - 29100	NON-GEO	140	20.0	230	10	-39.8

REMOTE CONTROL POINT LOCATION

E61. Call Sign NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.			E65. Phone Number
E62. Street Address			
E63. City	E67. County	E64/68. State/Country	E66. Zip Code

ANNEX 2 – Link Budgets

Representative link budgets for the 1.2m Orbit antenna at the St. Inigoes Earth Station are provided on the following two pages. Please see the chart below for reference.

Link Description	**Carrier**	**MODCOD**	**Table #**
1.2m in St. Inigoes	180 Msps in each direction	8PSK 0.67 FWD QPSK 0.33 RTN	1,2

O3b Networks Link Analysis - Tier2 Service for NGA @ St. Inigoes/U.S.A.

ECM Link Budget Rpt - 9/5/2014		Tier2	Tier2
Parameters	Unit	**Clear Sky**	
Ground parameters		**Teleport**	**Telco**
Location		Vernon/U.S.A.	St. Inigoes/U.S.A.
Latitude	(deg)	34.16	38.75
Longitude (East)	(deg)	260.71	-77.20
E/S Range to SV	(km)	10102.65	10314.59
E/S Elevation to SV	(deg)	30.87	28.03
E/S Altitude	(km)	0.00	54.00
SV Beam Identifier	(#)	12	
Telco Offset to Beam Center	(km)	0.26	
Modulation Parameters		**Return**	
Enter Reciever	Type	MEOLink	
Percentage of Bandwidth	(%)	50%	
Allocated Bandwidth	(MHz)	108	
Channel Symbol Rate	(Msps)	90	
Channel Modulation Type		QPSK	
Channel FEC Rate		0.60	
Channel Throughput	(Mbps)	106.40	
Uplink		**Return**	
E/S Carrier Frequencies	(MHz)	28020	
E/S Tx HPA Power Level	(W)	20	
E/S Tx OBO	(dB)	-4.17	
E/S Tx Antenna Gain (1.2m)	(dB)	48.50	
E/S Tx EIRP Per Channel	(dBW)	56.55	
E/S Tx RF Link Availability	(%)	Clear	
E/S Tx Spreading Loss	(dB)	-151.08	
Satellite		**Return**	
SV Rx G/T	(dB/K)	5.79	
SV Tx OBO	(dB)	-15.26	
SV Tx EIRP Per Channel/Carrier	dBW	33.00	
Downlink		**Return**	
E/S Rx Carrier Frequency	(MHz)	18220	
E/S Rx Rf Link Availability	(%)	Clear	
E/S Rx Antenna Gain (7.3m)	(dBi)	61.91	
E/S Rx Effective G/T	(dB/K)	40.46	
Total Link		**Return**	
Carrier/Noise Bandwidth	(dB)	45.00	
Carrier/Noise Uplink	(dB)	7.84	
Carrier/Noise Downlink	(dB)	23.73	
Carrier/Intermodulation Im (C/Im)	(dB)	25.00	
(C/N)- Total Actual (Es/No)	(dB)	6.24	
(C/N)-Total Required	(dB)	3.78	
(Eb/No)-Total Actual	(dB)	5.01	
(Eb/No)-Total Required	(dB)	2.55	
Excess Margin	(dB)	**2.46**	
Fade Margin	(dB)	**8.49**	

#1

O3b Networks Link Analysis - Tier2 Service for NGA @ St. Inigoes/U.S.A.

ECM Link Budget Rpt - 9/5/2014		Tier2	Tier2
Parameters	Unit	**Clear Sky**	
Ground parameters		**Teleport**	**Telco**
Location		Vernon/U.S.A.	St. Inigoes/U.S.A.
Latitude	(deg)	34.16	38.75
Longitude (East)	(deg)	260.71	-77.20
E/S Range to SV	(km)	10102.65	10314.59
E/S Elevation to SV	(deg)	30.87	28.03
E/S Altitude	(km)	0.00	54.00
SV Beam Identifier	(#)	12	
Telco Offset to Beam Center	(km)	0.26	
Modulation Parameters		**Forward**	
Enter Reciever	Type	MEOLink	
Percentage of Bandwidth	(%)	100%	
Allocated Bandwidth	(MHz)	216	
Channel Symbol Rate	(Msps)	180	
Channel Modulation Type		8PSK	
Channel FEC Rate		0.66	
Channel Throughput	(Mbps)	355.12	
Uplink		**Forward**	
E/S Carrier Frequencies	(MHz)	28020	
E/S Tx HPA Power Level	(W)	500	
E/S Tx OBO	(dB)	-10	
E/S Tx Antenna Gain (7.3m)	(dB)	65.31	
E/S Tx EIRP Per Channel	(dBW)	75.11	
E/S Tx RF Link Availability	(%)	Clear	
E/S Tx Spreading Loss	(dB)	-151.08	
Satellite		**Forward**	
SV Rx G/T	(dB/K)	5.44	
SV Tx OBO	(dB)	-3.80	
SV Tx EIRP Per Channel/Carrier	dBW	44.74	
Downlink		**Forward**	
E/S Rx Carrier Frequency	(MHz)	18220	
E/S Rx Rf Link Availability	(%)	Clear	
E/S Rx Antenna Gain (1.2m)	(dBi)	44.19	
E/S Rx Effective G/T	(dB/K)	20.70	
Total Link		**Forward**	
Carrier/Noise Bandwidth	(dB)	51.93	
Carrier/Noise Uplink	(dB)	23.84	
Carrier/Noise Downlink	(dB)	12.47	
Carrier/Intermodulation Im (C/Im)	(dB)	25.00	
(C/N)- Total Actual (Es/No)	(dB)	11.01	
(C/N)-Total Required	(dB)	8.48	
(Eb/No)-Total Actual	(dB)	7.51	
(Eb/No)-Total Required	(dB)	4.98	
Excess Margin	(dB)	**2.53**	
Fade Margin	(dB)	**13.26**	

#2

ANNEX 3 –Terminal Characteristics

The O3b 1.2 meter ("1.2m") terminals offers service data rates of up to 150 Mbps. The figure below shows this terminal.

Figure: O3b's 1.2 meter terminal

The 1.2m terminal is fully stabilized to account for the movement of the O3b satellite in its orbit. Each antenna is enclosed within a radome to protect it from the environment.

The Commission's rules for C-band and Ku-band maritime terminals include a pointing accuracy requirement and a shut-off requirement. In these bands, there must be a pointing error of less than 0.2° between the orbital location of the target satellite and the axis of the main lobe of each maritime terminals antenna.[35] O3b observes these requirements with its 1.2m Orbit terminal operations, and the manufacturer of O3b's 1.2m terminals has certified that the terminals comply with these requirements.

The internal controller software continuously monitors the instantaneous antenna tracking error and will cease transmissions within 100ms if an unexpected event occurs that causes the tracking error to exceed 0.5 degrees. Transmissions will not restart until the tracking error, relative to the target O3b satellite, is less than 0.2 degrees.

The 1.2m terminals are no smaller in antenna size than the range of antenna sizes that O3b has previously described to the Commission as its "Tier 2" service.[36] Therefore these 1.2m terminals present no new technical issues in terms of interference with respect to GSO or other NGSO satellite networks or terrestrial operators.

[35] *See* 47 C.F.R. §§ 25.221(a)(6) and 25.222(a)(6).
[36] *See* O3b's Hawaii application, FCC File No. SES-LIC-20100723-00952, Technical Attachment at Section A.5.

Annex 4 – The Comsearch Reports

The Comsearch reports for the 18 GHz band and the 28 GHz band are provided on the following pages.

Ka-Band Earth Station – St. Inigoes, MD

Frequency Coordination Report

28 GHz

Prepared on Behalf of
O3b Networks USA, LLC

August 18, 2014

COMSEARCH®
A CommScope Company

Table of Contents

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 St. Inigoes, MD, which will transmit at 28 GHz[1]. 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 18, 2014.

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 LTTS Coordination

In accordance with FCC Rules and Regulations, the Ka-Band earth station in St. Inigoes, MD 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 licensee on July 14, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 – 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheets for the Ka-Band earth station in St. Inigoes, MD were also sent to the following 28 GHz local television transmission licensee on July 14, 2014. 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 27.6 – 28.4 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 14, 2014. 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
Clearwire[2]	BTA029	Baltimore, MD
Nextlink/XO	BTA029	Baltimore, MD
RF Development, LLC	BTA116	Dover, DE
Straight Path Spectrum, LLC	BTA324	Norfolk - Virginia Beach - Newport News - Hampton, VA
Nextlink/XO	BTA346	Philadelphia, PA - Wilmington, DE - Trenton, NJ
T-Mobile	BTA346	Philadelphia, PA - Wilmington, DE - Trenton, NJ
Nextlink/XO	BTA374	Richmond-Petersburg, VA
RF Development, LLC	BTA398	Salisbury, MD
Nextlink/XO	BTA461[3]	Washington, DC

No objections were received from the LMDS incumbents.

[2] Clearwire 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 St. Inigoes, MD. This data was circulated to all incumbent licensees in the shared 28 GHz frequency ranges.

Date:	07/14/2014
Job Number:	<PCNJobCode>

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

Site Information	**ST. INIGOES, MD**
Venue Name	
Latitude (NAD 83)	38° 8' 23.3" N
Longitude (NAD 83)	76° 25' 43.7" W
Climate Zone	B
Rain Zone	2
Ground Elevation (AMSL)	3.26 m / 10.7 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		Orbit		Orbit
Model		1.2 Meter		1.2 Meter
Gain / Diameter		44.9 dBi / 1.2 m		48.5 dBi / 1.2 m
3-dB / 15-dB Beamwidth		0.90° / 2.10°		0.60° / 1.40°
Max Available RF Power	(dBW/4 kHz)			-13.5
	(dBW/MHz)			10.5
Maximum EIRP	(dBW/4 kHz)			35.0
	(dBW/MHz)			59.0
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)	1M00G7D - 216MG7D / 17852.0 - 18068.0	1M00G7D - 216MG7D / 27652.0 - 27868.0
	1M00G7D - 216MG7D / 18112.0 - 18328.0	1M00G7D - 216MG7D / 27912.0 - 28128.0
	1M00G7D - 216MG7D / 18372.0 - 18588.0	1M00G7D - 216MG7D / 28172.0 - 28388.0
Max Great Circle Coordination Distance	218.1 km / 135.5 mi	147.5 km / 91.6 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi	100.0 km / 62.1 mi

Coordination Values	**ST. INIGOES, MD**			
Licensee Name	O3b Networks USA, LLC.			
Latitude (NAD 83)	38° 8' 23.3" N			
Longitude (NAD 83)	76° 25' 43.7" W			
Ground Elevation (AMSL)	3.26 m / 10.7 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	Orbit 1.2 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		-8.8 (dBW/4 kHz)		

			Receive 18.0 GHz		Transmit 28.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	98.48	-10.00	151.60	-10.00	100.00
5	0.00	93.48	-10.00	151.60	-10.00	100.00
10	0.00	88.48	-10.00	149.80	-10.00	100.00
15	0.00	83.49	-10.00	148.80	-10.00	100.00
20	0.00	78.49	-10.00	150.20	-10.00	100.00
25	0.00	73.49	-10.00	149.80	-10.00	100.00
30	0.00	68.49	-10.00	148.70	-10.00	100.00
35	0.00	63.50	-10.00	144.00	-10.00	100.00
40	0.00	58.50	-10.00	140.60	-10.00	100.00
45	0.00	53.51	-10.00	146.00	-10.00	100.00
50	0.00	48.51	-10.00	151.50	-10.00	100.00
55	0.00	43.52	-10.00	144.00	-10.00	100.00
60	0.00	38.52	-9.72	143.10	-9.72	100.00
65	0.00	33.53	-8.53	141.40	-8.53	100.00
70	0.00	28.54	-7.21	147.00	-7.21	100.00
75	0.00	23.56	-5.71	148.90	-5.71	100.00
80	0.00	18.58	-4.02	162.50	-4.02	109.80
85	0.00	13.62	-2.07	167.70	-2.07	114.60
90	0.00	8.70	0.18	176.90	0.18	125.10
95	0.00	3.99	2.69	195.50	2.69	134.40
100	0.00	2.46	5.02	209.90	5.02	142.70
105	0.00	6.80	6.62	216.00	6.62	146.20
110	0.00	11.68	5.63	213.10	5.63	144.60
115	0.00	16.63	3.37	201.30	3.37	137.80
120	0.00	21.60	0.88	189.60	0.88	134.00
125	0.00	26.58	-1.15	181.00	-1.15	128.40
130	0.00	31.57	-2.81	174.70	-2.81	123.50
135	0.00	36.56	-4.20	172.40	-4.20	119.20
140	0.00	41.56	-5.38	168.20	-5.38	115.40
145	0.00	46.55	-6.38	164.60	-6.38	112.10
150	0.00	51.54	-7.23	161.60	-7.23	109.20
155	0.00	56.54	-7.93	159.00	-7.93	106.70
160	0.00	61.54	-8.50	157.00	-8.50	104.70
165	0.00	66.53	-8.95	155.40	-8.95	100.00
170	0.00	71.53	-9.27	154.20	-9.27	100.00
175	0.00	76.53	-9.46	153.50	-9.46	100.00
180	0.00	81.52	-9.52	153.30	-9.52	100.00
185	0.00	86.52	-9.46	153.50	-9.46	100.00

Coordination Values	**ST. INIGOES, MD**			
Licensee Name	O3b Networks USA, LLC.			
Latitude (NAD 83)	38° 8' 23.3" N			
Longitude (NAD 83)	76° 25' 43.7" W			
Ground Elevation (AMSL)	3.26 m / 10.7 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	Orbit 1.2 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		-8.8 (dBW/4 kHz)		

			Receive 18.0 GHz		Transmit 28.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	91.52	-9.27	154.20	-9.27	100.00
195	0.00	96.51	-8.95	155.40	-8.95	100.00
200	0.00	101.51	-8.50	157.00	-8.50	104.70
205	0.00	106.51	-7.93	159.00	-7.93	106.70
210	0.00	111.51	-7.23	161.60	-7.23	109.20
215	0.00	116.50	-6.38	164.60	-6.38	112.10
220	0.00	121.50	-5.38	168.20	-5.38	115.40
225	0.00	126.49	-4.21	172.40	-4.21	119.20
230	0.00	131.49	-2.81	174.70	-2.81	123.50
235	0.00	136.48	-1.15	181.00	-1.15	128.40
240	0.00	141.48	0.89	189.60	0.89	134.00
245	0.00	146.47	3.38	201.40	3.38	137.90
250	0.00	151.46	5.69	213.50	5.69	144.80
255	0.00	156.44	6.52	218.10	6.52	147.50
260	0.00	161.42	5.15	210.60	5.15	143.10
265	0.00	166.38	2.69	198.00	2.69	135.90
270	0.00	171.30	0.17	186.50	0.17	132.10
275	0.00	176.01	-2.07	177.50	-2.07	125.70
280	0.00	177.54	-4.01	173.10	-4.01	119.80
285	0.00	173.20	-5.71	167.00	-5.71	114.30
290	0.00	168.32	-7.20	161.70	-7.20	109.30
295	0.00	163.37	-8.52	156.90	-8.52	104.60
300	0.00	158.40	-9.71	152.60	-9.71	100.00
305	0.00	153.42	-10.00	151.60	-10.00	100.00
310	0.00	148.43	-10.00	151.60	-10.00	100.00
315	0.00	143.44	-10.00	151.60	-10.00	100.00
320	0.00	138.44	-10.00	151.60	-10.00	100.00
325	0.00	133.45	-10.00	151.60	-10.00	100.00
330	0.00	128.46	-10.00	150.10	-10.00	100.00
335	0.00	123.46	-10.00	150.90	-10.00	100.00
340	0.00	118.46	-10.00	151.60	-10.00	100.00
345	0.00	113.47	-10.00	151.60	-10.00	100.00
350	0.00	108.47	-10.00	151.60	-10.00	100.00
355	0.00	103.47	-10.00	151.60	-10.00	100.00

Date:	07/14/2014
Job Number:	<PCNJobCode>

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

Site Information	**ST INIGOES, MD**
Venue Name	
Latitude (NAD 83)	38° 8' 23.3" N
Longitude (NAD 83)	76° 25' 43.7" W
Climate Zone	B
Rain Zone	2
Ground Elevation (AMSL)	3.26 m / 10.7 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		GD Satcom		GD Satcom
Model		2.4 Meter		2.4 Meter
Gain / Diameter		52.6 dBi / 2.4 m		55.8 dBi / 2.4 m
3-dB / 15-dB Beamwidth		0.12° / 0.30°		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)			-8.8
	(dBW/MHz)			15.2
Maximum EIRP	(dBW/4 kHz)			47.0
	(dBW/MHz)			71.0
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)	1M00G7D - 216MG7D / 17852.0 - 18068.0	1M00G7D - 216MG7D / 27652.0 - 27868.0
	1M00G7D - 216MG7D / 18112.0 - 18328.0	1M00G7D - 216MG7D / 27912.0 - 28128.0
	1M00G7D - 216MG7D / 18372.0 - 18588.0	1M00G7D - 216MG7D / 28172.0 - 28388.0
Max Great Circle Coordination Distance	199.0 km / 123.6 mi	158.3 km / 98.4 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi	100.0 km / 62.1 mi

Coordination Values	**ST INIGOES, MD**			
Licensee Name	O3b Networks USA, LLC.			
Latitude (NAD 83)	38° 8' 23.3" N			
Longitude (NAD 83)	76° 25' 43.7" W			
Ground Elevation (AMSL)	3.26 m / 10.7 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	GD Satcom 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		-8.8 (dBW/4 kHz)		

			Receive 18.0 GHz		Transmit 28.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	98.48	-10.00	136.20	-10.00	109.90
5	0.00	93.48	-10.00	136.20	-10.00	109.90
10	0.00	88.48	-10.00	134.90	-10.00	108.80
15	0.00	83.49	-10.00	134.20	-10.00	108.00
20	0.00	78.49	-10.00	135.20	-10.00	109.00
25	0.00	73.49	-10.00	134.90	-10.00	108.70
30	0.00	68.49	-10.00	134.10	-10.00	108.00
35	0.00	63.50	-10.00	130.90	-10.00	104.90
40	0.00	58.50	-10.00	128.70	-10.00	104.30
45	0.00	53.51	-10.00	132.30	-10.00	103.10
50	0.00	48.51	-10.00	136.10	-10.00	106.90
55	0.00	43.52	-10.00	130.80	-10.00	108.20
60	0.00	38.52	-9.72	130.30	-9.72	117.30
65	0.00	33.53	-8.53	129.30	-8.53	120.80
70	0.00	28.54	-7.21	133.40	-7.21	127.90
75	0.00	23.56	-5.71	135.10	-5.71	139.30
80	0.00	18.58	-4.02	145.60	-4.02	147.50
85	0.00	13.62	-2.07	150.20	-2.07	156.80
90	0.00	8.70	0.18	161.20	0.18	149.30
95	0.00	3.99	2.69	175.60	2.69	142.70
100	0.00	2.46	5.02	185.50	5.02	135.80
105	0.00	6.80	6.62	197.40	6.62	130.40
110	0.00	11.68	5.63	187.70	5.63	126.30
115	0.00	16.63	3.37	179.60	3.37	123.80
120	0.00	21.60	0.88	170.90	0.88	121.00
125	0.00	26.58	-1.15	164.00	-1.15	118.60
130	0.00	31.57	-2.81	158.40	-2.81	116.60
135	0.00	36.56	-4.20	153.40	-4.20	114.90
140	0.00	41.56	-5.38	149.70	-5.38	113.50
145	0.00	46.55	-6.38	146.60	-6.38	112.40
150	0.00	51.54	-7.23	144.10	-7.23	111.70
155	0.00	56.54	-7.93	142.00	-7.93	111.20
160	0.00	61.54	-8.50	140.40	-8.50	111.10
165	0.00	66.53	-8.95	139.10	-8.95	112.40
170	0.00	71.53	-9.27	138.20	-9.27	111.70
175	0.00	76.53	-9.46	137.70	-9.46	111.20
180	0.00	81.52	-9.52	137.50	-9.52	111.10
185	0.00	86.52	-9.46	137.70	-9.46	111.20

Coordination Values	**ST INIGOES, MD**			
Licensee Name	O3b Networks USA, LLC.			
Latitude (NAD 83)	38° 8' 23.3" N			
Longitude (NAD 83)	76° 25' 43.7" W			
Ground Elevation (AMSL)	3.26 m / 10.7 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	GD Satcom 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		-8.8 (dBW/4 kHz)		

			Receive 18.0 GHz		Transmit 28.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	91.52	-9.27	138.20	-9.27	111.70
195	0.00	96.51	-8.95	139.10	-8.95	112.40
200	0.00	101.51	-8.50	140.40	-8.50	113.50
205	0.00	106.51	-7.93	142.00	-7.93	114.90
210	0.00	111.51	-7.23	144.10	-7.23	116.60
215	0.00	116.50	-6.38	146.60	-6.38	118.60
220	0.00	121.50	-5.38	149.70	-5.38	121.00
225	0.00	126.49	-4.21	153.40	-4.21	123.80
230	0.00	131.49	-2.81	158.40	-2.81	126.30
235	0.00	136.48	-1.15	164.00	-1.15	130.40
240	0.00	141.48	0.89	170.90	0.89	135.80
245	0.00	146.47	3.38	179.60	3.38	142.70
250	0.00	151.46	5.69	188.00	5.69	149.50
255	0.00	156.44	6.52	199.00	6.52	158.30
260	0.00	161.42	5.15	186.00	5.15	147.90
265	0.00	166.38	2.69	177.20	2.69	140.70
270	0.00	171.30	0.17	168.50	0.17	133.90
275	0.00	176.01	-2.07	160.90	-2.07	128.10
280	0.00	177.54	-4.01	154.00	-4.01	124.30
285	0.00	173.20	-5.71	148.70	-5.71	120.20
290	0.00	168.32	-7.20	144.20	-7.20	116.60
295	0.00	163.37	-8.52	140.30	-8.52	113.50
300	0.00	158.40	-9.71	137.00	-9.71	110.60
305	0.00	153.42	-10.00	136.20	-10.00	109.90
310	0.00	148.43	-10.00	136.20	-10.00	109.90
315	0.00	143.44	-10.00	136.20	-10.00	109.90
320	0.00	138.44	-10.00	136.20	-10.00	109.90
325	0.00	133.45	-10.00	136.20	-10.00	109.90
330	0.00	128.46	-10.00	135.10	-10.00	108.90
335	0.00	123.46	-10.00	135.70	-10.00	109.50
340	0.00	118.46	-10.00	136.20	-10.00	109.90
345	0.00	113.47	-10.00	136.20	-10.00	109.90
350	0.00	108.47	-10.00	136.20	-10.00	109.90
355	0.00	103.47	-10.00	136.20	-10.00	109.90

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.
ST. INIGOES, MD
(1.2 Meter)
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
August 19, 2014

TABLE OF CONTENTS

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.

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 07/14/2014.

Company
APC Realty and Equipment CO LLC
Airband Communications Inc
Arlington County Emergency Comm Ctr
B.F. SAUL COMPANY
Believe Wireless, LLC
Blaze Broadband
CBS Broadcasting Inc
CBS Communication Services Inc
COMMONWEALTH PUBLIC BROADCASTING
Calvert, County of
Chesapeake Television Licensee, LLC
Clearwire Spectrum Holdings II, LLC
Clearwire Spectrum Holdings III, LLC
Clearwire Spectrum Holdings LLC
Commissioners of Caroline County
ECW Wireless, LLC
Enoch Pratt Free Library
George Washington University
HENRICO COUNTY
Hampton Roads Educational Telecommunicat
Home Sales Company, Inc
Loudoun, County of
MPX
Maryland Port Administration
Maryland, State Of - MDOT - MTA
NBC Telemundo License LLC
New Cingular Wireless PCS LLC - VA
New Kent County
Powhatan,County of
Prince William, County of
Radio One Inc
RapidDSL & Wireless, Inc.
Red Zebra Broadcasting Licensee, LLC
Richmond 20 MHz LLC
Richmond PCS Alliance, L.C.
Roadstar Internet, Inc.
SALISBURY UNIVERSITY FOUNDATION, INC
Sprint Spectrum L.P.
Sprintcom, Inc
Telecom Transport Management, Inc
WASHINGTON CABLE SYSTEMS INC

WICOMICO BOARD OF EDUCATION
WKYSFM, INC
WRLH Licensee, LLC
Washington Metro Area Transit Police Dep
Wicomico County
Wor-Wic Community College
World Class Wireless, 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:	08/19/2014
Job Number:	140714COMSGE03

Administrative Information

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

Site Information — ST. INIGOES, MD

Venue Name	
Latitude (NAD 83)	38° 8' 23.3" N
Longitude (NAD 83)	76° 25' 43.7" W
Climate Zone	B
Rain Zone	2
Ground Elevation (AMSL)	3.26 m / 10.7 ft

Link Information

Satellite Type	Low 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		Orbit		Orbit	
Model		1.2 Meter		1.2 Meter	
Gain / Diameter		44.9 dBi / 1.2 m		48.5 dBi / 1.2 m	
3-dB / 15-dB Beamwidth		0.90° / 2.10°		0.60° / 1.40°	
Max Available RF Power	(dBW/4 kHz)			-13.5	
	(dBW/MHz)			10.5	
Maximum EIRP	(dBW/4 kHz)			35.0	
	(dBW/MHz)			59.0	
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)	1M00G7D - 216MG7D / 17852.0 - 18068.0	1M00G7D - 216MG7D / 27652.0 - 27868.0
	1M00G7D - 216MG7D / 18112.0 - 18328.0	1M00G7D - 216MG7D / 27912.0 - 28128.0
	1M00G7D - 216MG7D / 18372.0 - 18588.0	1M00G7D - 216MG7D / 28172.0 - 28388.0
Max Great Circle Coordination Distance	218.1 km / 135.5 mi	147.5 km / 91.6 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	**ST. INIGOES, MD**			
Licensee Name	O3b Networks USA, LLC.			
Latitude (NAD 83)	38° 8' 23.3" N			
Longitude (NAD 83)	76° 25' 43.7" W			
Ground Elevation (AMSL)	3.26 m / 10.7 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	Orbit 1.2 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			-13.5 (dBW/4 kHz)	

			Receive 18.0 GHz		Transmit 28.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	98.48	-10.00	151.60	-10.00	100.00
5	0.00	93.48	-10.00	151.60	-10.00	100.00
10	0.00	88.48	-10.00	149.80	-10.00	100.00
15	0.00	83.49	-10.00	148.80	-10.00	100.00
20	0.00	78.49	-10.00	150.20	-10.00	100.00
25	0.00	73.49	-10.00	149.80	-10.00	100.00
30	0.00	68.49	-10.00	148.70	-10.00	100.00
35	0.00	63.50	-10.00	144.00	-10.00	100.00
40	0.00	58.50	-10.00	140.60	-10.00	100.00
45	0.00	53.51	-10.00	146.00	-10.00	100.00
50	0.00	48.51	-10.00	151.50	-10.00	100.00
55	0.00	43.52	-10.00	144.00	-10.00	100.00
60	0.00	38.52	-9.72	143.10	-9.72	100.00
65	0.00	33.53	-8.53	141.40	-8.53	100.00
70	0.00	28.54	-7.21	147.00	-7.21	100.00
75	0.00	23.56	-5.71	148.90	-5.71	100.00
80	0.00	18.58	-4.02	162.50	-4.02	109.80
85	0.00	13.62	-2.07	167.70	-2.07	114.60
90	0.00	8.70	0.18	176.90	0.18	125.10
95	0.00	3.99	2.69	195.50	2.69	134.40
100	0.00	2.46	5.02	209.90	5.02	142.70
105	0.00	6.80	6.62	216.00	6.62	146.20
110	0.00	11.68	5.63	213.10	5.63	144.60
115	0.00	16.63	3.37	201.30	3.37	137.80
120	0.00	21.60	0.88	189.60	0.88	134.00
125	0.00	26.58	-1.15	181.00	-1.15	128.40
130	0.00	31.57	-2.81	174.70	-2.81	123.50
135	0.00	36.56	-4.20	172.40	-4.20	119.20
140	0.00	41.56	-5.38	168.20	-5.38	115.40
145	0.00	46.55	-6.38	164.60	-6.38	112.10
150	0.00	51.54	-7.23	161.60	-7.23	109.20
155	0.00	56.54	-7.93	159.00	-7.93	106.70
160	0.00	61.54	-8.50	157.00	-8.50	104.70
165	0.00	66.53	-8.95	155.40	-8.95	100.00
170	0.00	71.53	-9.27	154.20	-9.27	100.00
175	0.00	76.53	-9.46	153.50	-9.46	100.00
180	0.00	81.52	-9.52	153.30	-9.52	100.00
185	0.00	86.52	-9.46	153.50	-9.46	100.00

COMSEARCH

Earth Station Data Sheet

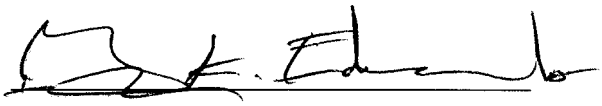
19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 http://www.comsearch.com

Coordination Values	**ST. INIGOES, MD**			
Licensee Name	O3b Networks USA, LLC.			
Latitude (NAD 83)	38° 8' 23.3" N			
Longitude (NAD 83)	76° 25' 43.7" W			
Ground Elevation (AMSL)	3.26 m / 10.7 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	Orbit 1.2 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			-13.5 (dBW/4 kHz)	

			Receive 18.0 GHz		Transmit 28.0 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	91.52	-9.27	154.20	-9.27	100.00
195	0.00	96.51	-8.95	155.40	-8.95	100.00
200	0.00	101.51	-8.50	157.00	-8.50	104.70
205	0.00	106.51	-7.93	159.00	-7.93	106.70
210	0.00	111.51	-7.23	161.60	-7.23	109.20
215	0.00	116.50	-6.38	164.60	-6.38	112.10
220	0.00	121.50	-5.38	168.20	-5.38	115.40
225	0.00	126.49	-4.21	172.40	-4.21	119.20
230	0.00	131.49	-2.81	174.70	-2.81	123.50
235	0.00	136.48	-1.15	181.00	-1.15	128.40
240	0.00	141.48	0.89	189.60	0.89	134.00
245	0.00	146.47	3.38	201.40	3.38	137.90
250	0.00	151.46	5.69	213.50	5.69	144.80
255	0.00	156.44	6.52	218.10	6.52	147.50
260	0.00	161.42	5.15	210.60	5.15	143.10
265	0.00	166.38	2.69	198.00	2.69	135.90
270	0.00	171.30	0.17	186.50	0.17	132.10
275	0.00	176.01	-2.07	177.50	-2.07	125.70
280	0.00	177.54	-4.01	173.10	-4.01	119.80
285	0.00	173.20	-5.71	167.00	-5.71	114.30
290	0.00	168.32	-7.20	161.70	-7.20	109.30
295	0.00	163.37	-8.52	156.90	-8.52	104.60
300	0.00	158.40	-9.71	152.60	-9.71	100.00
305	0.00	153.42	-10.00	151.60	-10.00	100.00
310	0.00	148.43	-10.00	151.60	-10.00	100.00
315	0.00	143.44	-10.00	151.60	-10.00	100.00
320	0.00	138.44	-10.00	151.60	-10.00	100.00
325	0.00	133.45	-10.00	151.60	-10.00	100.00
330	0.00	128.46	-10.00	150.10	-10.00	100.00
335	0.00	123.46	-10.00	150.90	-10.00	100.00
340	0.00	118.46	-10.00	151.60	-10.00	100.00
345	0.00	113.47	-10.00	151.60	-10.00	100.00
350	0.00	108.47	-10.00	151.60	-10.00	100.00
355	0.00	103.47	-10.00	151.60	-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: August 19, 2014