

APPLICATION

O3b Limited (“O3b”) operates a U.K.-authorized, Ka-band non-geostationary orbit (“NGSO”) system operating in the Fixed-Satellite Service (“FSS”) and Mobile-Satellite Service (“MSS”) that has been granted U.S. market access pursuant to Section 25.137 of the Commission’s rules.¹ In this application, O3b seeks a new earth station license permitting it to operate three CGC 5.5 meter antennas in Haleiwa, Hawaii (the “Hawaii mPOWER Gateway”).

Public Interest Showing

O3b will use the Hawaii mPOWER Gateway to land data traffic from O3b’s next generation NGSO constellation, mPOWER,² and to perform Telemetry, Tracking and Command (“TT&C”) functions for mPOWER. Granting the requested Hawaii mPOWER Gateway license will serve the public interest by facilitating the deployment of the mPOWER system, which will provide high-speed, low-latency MEO connectivity throughout the U.S. and abroad.

Frequency Plan

The Hawaii mPOWER Gateway will communicate with O3b’s NGSO satellite system using the following frequencies:

- 27.5-30.0 GHz (uplink)
- 17.7-18.6 GHz and 18.8-20.2 GHz (downlink)

The Hawaii mPOWER Gateway antennas will be mounted on fixed platforms. Although the pointing angle of each antenna will change as O3b’s in-orbit satellites are tracked, the platforms will remain stationary. In the 28.6-29.1 GHz and 18.8-19.3 GHz bands, NGSO FSS operations have sole primary status. In the remaining frequency bands, which are shared with other services, O3b’s proposed Hawaii mPOWER Gateway will operate in a manner consistent with the Commission’s rules and policies. O3b addresses each of these shared bands below.

¹ See *O3b Limited*, Order and Declaratory Ruling, 33 FCC Rcd 5508 (2018) (the “Market Access Grant”); 47 C.F.R. § 25.137.

² The O3b mPOWER satellite communication system incorporates terrestrial networks and ground-based infrastructure with high-throughput satellites (“HTS”) located in Medium Earth Orbit (“MEO”). The space segment design consists of seven HTS, each of which will deliver capacity through more than 4,000 steerable beams that can be shifted and adjusted to cover specific locations and meet customer needs.

O3b Operations in Shared Bands

Uplink

27.5-28.35 GHz – Sharing with primary terrestrial stations

In the 27.5-28.35 GHz band, the Upper Microwave Flexible Use Service (“UMFUS”) has a primary allocation, and FSS operations are permitted on a secondary basis. Pursuant to Section 25.136(a), an earth station licensee may be authorized to operate in this band without providing interference protection to future UMFUS stations if certain requirements are met.³ Attachment A to this application demonstrates that the Hawaii mPOWER Gateway will meet all the criteria of Section 25.136(a)(4).

The Comsearch report (Attachment B hereto) demonstrates that O3b can operate its Hawaii mPOWER Gateway without causing harmful interference to existing terrestrial deployments and confirms that O3b’s planned operations have been coordinated with any UMFUS licensees in compliance with 47 C.F.R. § 101.103(d). Comsearch sent a coordination notice to all existing terrestrial licensees within the coordination contours of the Hawaii mPOWER Gateway site. No objections were received from any of the licensees.

27.5-28.6 & 29.5-30 GHz – Sharing with primary GSO FSS operators

NGSO FSS systems are required to protect geostationary orbit (“GSO”) FSS systems throughout the 27.5-28.6 GHz and 29.5-30 GHz bands. Both NGSO and GSO FSS systems are secondary to UMFUS in the 27.5-28.35 GHz band, but the Commission has also specified that NGSO FSS systems in this band must operate on an unprotected, non-interference basis with respect to GSO FSS networks.⁴ In the 28.35-28.6 GHz band, there is a primary allocation for GSO FSS systems and a secondary allocation for NGSO FSS systems.⁵

The Commission has granted O3b U.S. market access in Ka-band uplink spectrum in which GSO FSS has priority status based on O3b’s demonstration that its NGSO operations are not likely to cause harmful interference to GSO networks⁶ and subject to conditions specifying

³ 47 C.F.R. § 25.136(a). *See also Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 (2016) at Appendix A.

⁴ *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809 (2017) (the “NGSO Order”) at 7817, ¶ 23 and Appendix B, Adopted Ka-band Plan.

⁵ *See id.*, Appendix B, Adopted Ka-band Plan.

⁶ *See, e.g.*, IBFS File No. SAT-AMD-20161115-00116 (the “O3b Amendment”), Technical Annex at 13-19.

that the O3b operations are not entitled to protection from interference caused by GSO systems.⁷ O3b's request to operate the Hawaii mPOWER Gateway in the 27.5-28.6 GHz and 29.5-30 GHz band segments is consistent with these provisions and other applicable Commission requirements.

Pursuant to Sections 25.115(f)(1) and 25.146(a)(2) of the Commission's rules, O3b hereby certifies that the earth station operations proposed herein will comply with the applicable equivalent power flux-density ("EPFD") levels in Article 22, Section II, and Resolution 76 of the ITU Radio Regulations. The Commission has recognized that any NGSO system that complies with these international EPFD limits "is considered as having fulfilled its obligation . . . not to cause unacceptable interference to any GSO network."⁸ Moreover, O3b will not claim protection from interference from U.S.-licensed GSO FSS networks in the 27.5-28.6 GHz and 29.5-30 GHz bands.

29.1-29.5 GHz – Sharing with co-primary MSS feeder links and terrestrial stations

O3b requests authority to use the 29.1-29.5 GHz band on a co-primary basis for MSS feeder links. Data communication from O3b's feeder links using 29.1-29.5 GHz will be associated with mobile user terminals.

The O3b mPOWER Gateway will not interfere with Iridium, the only MSS operator using this frequency band. Iridium's operations in this band are limited: it does not use the 29.3-29.5 GHz spectrum at all and uses the 29.1-29.3 GHz band only in a single polarization (right-hand circular polarization).

Section 25.203(k) of the Commission's rules specifies that an applicant for shared spectrum can either demonstrate that it will not cause unacceptable interference to authorized users or certify that it will conform to established coordination agreements.⁹ O3b is engaged in active coordination discussions with Iridium to address the Hawaii location and other planned mPOWER gateway sites. While coordination discussions are still ongoing for co-polarized operations, O3b and Iridium have agreed that cross-polarized operations in the 29.1-29.3 GHz band will not cause unacceptable interference to Iridium. Accordingly, granting O3b authority for the 29.1-29.3 GHz band segment with left-hand circular polarization and for the 29.3-29.5 GHz band segment unused by Iridium is consistent with Commission rules. Once coordination discussions have been completed, O3b will update its demonstration under Section 25.203(k) for co-polarized operations in the 29.1-29.3 GHz band, by either certifying

⁷ See Market Access Grant, 33 FCC Rcd at 5514, ¶¶ 13-16 and 5525, ¶ 46.

⁸ NGSO Order, 32 FCC Rcd at 7820, ¶ 32 (footnote omitted). See also 47 C.F.R. § 25.289.

⁹ 47 C.F.R. § 25.203(k).

that O3b will conform to the coordination agreement with Iridium or by providing a non-interference showing for co-polarized operations in this band segment.

O3b's request for authority is also consistent with applicable Commission rules for coordination between NGSO FSS feeder link operations and local terrestrial licensees. Under the Commission's Ka-band Plan, terrestrial Local Multipoint Distribution Service ("LMDS") is co-primary with NGSO MSS feeder links in the 29.1-29.25 GHz band segment, but no party holds an active LMDS authorization in the state of Hawaii.¹⁰

Downlink

17.7-17.8 GHz – Sharing with co-primary FS and BSS feeder links

The 17.7-17.8 GHz band is allocated on a primary basis to terrestrial Fixed Service ("FS") operations, and to FSS Earth-to-space transmissions for broadcasting-satellite service ("BSS") feeder links on a secondary basis.¹¹ As further discussed below, O3b requests a waiver of the U.S. Table of Frequency Allocations and the Ka-band plan to allow the Hawaii mPOWER Gateway to receive signals in the 17.7-17.8 GHz band on a non-conforming basis.

O3b has demonstrated that transmissions from its satellites will not cause interference to BSS feeder link operations or to terrestrial fixed networks,¹² and O3b hereby incorporates this showing by reference herein. The Market Access Grant does not extend to operations in the 17.7-17.8 GHz band,¹³ but the satellite system is capable of operating in this band segment, and O3b seeks earth station market access to permit the Hawaii mPOWER Gateway to receive transmissions in the spectrum. As a non-conforming user of the spectrum, O3b will accept any interference caused by FS and BSS feeder link operations in this band segment.

¹⁰ See Call Sign E140107, IBFS File No. SES-LIC-20141022-00809, Annex 4, granted June 5, 2015. A search of the Commission's Universal Licensing Service confirms that no terrestrial system is licensed in the 29.1-29.5 GHz frequencies in Hawaii. Accordingly, O3b requests any necessary waiver of the requirements of Section 25.203 regarding coordination of earth station operations with terrestrial systems.

¹¹ NGSO Order, 32 FCC Rcd at 7850, Appendix B.

¹² See O3b Amendment, Technical Annex at 21.

¹³ Market Access Grant, 33 FCC Rcd at 5510, n.10.

17.8-18.3 GHz – Sharing with primary FS operators

The 17.8-18.3 GHz band is allocated on a primary basis to FS and on a secondary basis to FSS.¹⁴ O3b seeks authority to receive Ka-band NGSO FSS downlink signals in this band on a secondary basis and will accept any interference from primary FS networks and other services.

In the Market Access Grant the Commission authorized O3b's space stations to transmit in this band subject to compliance with ITU power flux density ("PFD") limits at the earth's surface that are designed to protect terrestrial services in this band.¹⁵ The Commission also specified that O3b's use of this spectrum is secondary with respect to the fixed service,¹⁶ requiring O3b to accept interference from FS operations in the band. The Comsearch report provided as Attachment B confirms that there will be no unacceptable restrictions on O3b's operations due to interference considerations in this band.

18.3-18.6 GHz & 19.7-20.2 GHz – Sharing with primary GSO operators and other secondary NGSO operators

The 18.3-18.6 GHz and 19.7-20.2 GHz bands are allocated in the United States on a primary basis to GSO FSS and on a secondary basis to NGSO FSS. O3b requests authority for the Hawaii mPOWER Gateway to receive in these bands.

In the Market Access Grant the Commission authorized O3b's space stations to transmit in these frequencies subject to compliance with "the applicable power flux-density and equivalent power-flux density limits contained in Section 25.208, 47 C.F.R. § 25.208, and Articles 21 and 22, as well as Resolution 76 of the ITU Radio Regulations."¹⁷ In addition, the Commission required O3b to "cooperate with other NGSO operators in order to ensure that all authorized operations, including MSS operations in the 19.7-20.2 GHz band, jointly comport with the applicable limits for aggregate EPFD in the space-to-Earth direction (EPFD_{down}) contained in Article 22 of the ITU Radio Regulations, and Resolution 76 of the ITU Radio Regulations."¹⁸ O3b recognizes that its MSS operations in the 19.7-20.2 GHz frequencies must not cause harmful interference to, and are not entitled to interference protection from, FSS

¹⁴ NGSO Order, 32 FCC Rcd at 7812, ¶¶ 7-8, and 7850, Appendix B.

¹⁵ Market Access Grant, 33 FCC Rcd at 5525, ¶ 46(a).

¹⁶ *Id.* at 5526, ¶ 46(g).

¹⁷ *Id.* at 5525, ¶ 46(a). *See* O3b Amendment, Technical Annex at 13-19 for a discussion of O3b's compliance with the operational limits in Article 22 of the ITU Radio Regulations.

¹⁸ Market Access Grant, 33 FCC Rcd at 5525, ¶ 46(b).

operations in this band segment.¹⁹ O3b will also conform to the terms of its current and future coordination agreements with U.S. Federal systems in the 19.7-20.2 GHz frequency bands.²⁰

19.3-19.7 GHz – Sharing with co-primary NGSO MSS feeder links and GSO FSS stations

O3b requests authority for the Hawaii mPOWER Gateway to receive in the 19.3-19.7 GHz band. Iridium does not use the 19.3-19.4 GHz and 19.6-19.7 GHz segments at all and uses the 19.4-19.6 GHz band only in a single polarization (left-hand circular polarization). As discussed above, O3b is engaged in active coordination with Iridium, and while discussions are still ongoing for co-polarized operations, O3b and Iridium have agreed that cross-polarized operations in the 19.4-19.6 GHz band Iridium uses will not cause unacceptable interference to Iridium. Accordingly, granting O3b authority for the 19.4-19.6 GHz band segment with right-hand circular polarization and for the 19.3-19.4 GHz and 19.6-19.7 GHz band segments unused by Iridium is consistent with Commission rules. Once coordination discussions have been completed, O3b will update its demonstration under Section 25.203(k) for co-polarized operations in the 19.4-19.6 GHz band, by either certifying that O3b will conform to the coordination agreement with Iridium or by providing a non-interference showing for co-polarized operations in this band segment. O3b will also coordinate with U.S. Federal systems and co-primary GSO FSS stations.

Waiver of the Table of Allocations and the Commission’s Ka-Band Plan

O3b seeks a limited waiver of Commission policies to permit the Hawaii mPOWER Gateway to receive signals in the 17.7-17.8 GHz band. The Commission may waive a rule for good cause shown.²¹ A waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the rule, and if the relief requested would not undermine the policy objective of the rule and would otherwise serve the public interest.²²

The Commission previously waived the U.S. Table of Allocations and the Ka-Band Plan to permit the O3b constellation to use Ka-band frequencies in which terrestrial fixed services have a primary allocation at a time when there was no allocation in that spectrum for NGSO FSS

¹⁹ *Id.* at 5525, ¶ 46(d).

²⁰ *Id.* at 5526, ¶ 46(h).

²¹ 47 C.F.R. § 1.3. *See also WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990) (“*Northeast Cellular*”).

²² *See Northeast Cellular*, 897 F.2d at 1166.

operations.²³ Commission precedent supports granting a similar waiver to allow the Hawaii mPOWER Gateway to receive transmissions in the 17.7-17.8 GHz band as proposed in this application.²⁴ As demonstrated in the Technical Annex to the O3b Amendment,²⁵ O3b's operations on a non-conforming basis would not create the potential for harmful interference to U.S.-licensed terrestrial systems. Moreover, as a non-conforming user, O3b will accept interference from primary FS and BSS users in this band. As a result, waiver of the Table of Allocations, footnote US271, and the Ka-Band Plan would serve the public interest.

Conclusion

For the reasons stated herein, the Commission should grant the Hawaii mPOWER Gateway license to permit O3b to operate three CGC 5.5 meter antennas in Haleiwa, Hawaii.

²³ See, e.g., *O3b Limited*, IBFS File Nos. SAT-LOI-20141029-00118 and SAT-AMD-20150115-00004 (granted Jan. 22, 2015) at ¶ 4 (granting waiver of the Table of Allocations and the Ka-Band Plan for O3b's operations in the 17.8-18.6 GHz frequencies).

²⁴ See *Inmarsat Mobile Networks, Inc. Application to Operate a Fixed-Satellite Service Gateway Earth Station Facility in Lino Lakes, Minnesota with the Inmarsat-5 F2 Space Station*, Order and Authorization and Declaratory Ruling, 30 FCC Rcd 2770, 2785, ¶ 44 (IB 2015) (waiving the Table of Allocations and footnote US271 to permit Inmarsat to receive downlink transmissions in the 17.7-17.8 GHz band on an unprotected, non-harmful interference basis at its gateway earth station in Lino Lakes, MN).

²⁵ See O3b Amendment, Technical Annex at 21.