June 20, 2019

VIA ELECTRONIC FILING

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: O3b Limited
IBFS File No. SES-MOD-20190207-00084
Call Sign: E100088

Dear Ms. Dortch:

Pursuant to a request from the Commission's Satellite Division, O3b Limited ("O3b") hereby submits additional analysis for its E100088 earth station to update its showing that the earth station meets the standards of 47 C.F.R. § 25.136(a)(4) of the Commission's rules and that O3b is not required to protect future Upper Microwave Flexible Use Service ("UMFUS") deployments in the 27.5-27.6 GHz band. In the event the Commission disagrees with O3b's conclusion, however, O3b renews its request for waiver of Section 25.136(a)(4) as needed to allow use of that band segment without an interference protection obligation.

In its modification application for this earth station, O3b made a request for a waiver of 47 C.F.R. § 25.136(a), which describes the circumstances that allow an earth station licensee to operate without being obligated to protect UMFUS stations. *See* File No. SES-MOD-20190207-00084 (the "E100088 Application").

At the request of the Commission, O3b has prepared a revised analysis that demonstrates the potential impact of its PFD contour in more detail. This new analysis is attached as "Supplemental Showing" to this letter. The new analysis demonstrates that the E100088 earth station will still meet the standards of 47 C.F.R. § 25.136(a)(4) and is therefore qualified to operate without providing interference protection to future UMFUS stations.

In light of this showing, O3b requests that the Commission grant the modification of the E100088 earth station license to add the 27.5-27.6 GHz band, as well as the other bands sought in the modification application, and that O3b may operate in the 27.5-27.6 GHz band without providing interference protection to stations in the Upper Microwave Flexible Use Service. Doing so will serve the public interest by authorizing O3b operations at its earth station consistent with Commission policies.

Respectfully submitted,

/s/ Will Lewis
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Attachment

Supplemental Showing – Compliance with 47 C.F.R. § 25.136(a)(4)

The following analysis supplements the pending application of O3b Limited ("O3b") for modification of its earth station license in Honolulu County, Hawaii (the "Hawaii Gateway") in order to add certain frequency bands, including 27.5-27.6 GHz.[1] In that application, O3b explained that because the original license for the Hawaii Gateway was granted prior to July 14, 2016, the station has grandfathered status under Section 25.136(a) of the Commission's rules with respect to its current operations in the 27.6-28.35 GHz band, and O3b argued that the grandfathered status should be extended to the proposed new operations in the 27.5-27.6 GHz spectrum as well.[2] Alternatively, O3b sought a limited waiver of Section 25.136(a) to allow the Hawaii Gateway to use the 27.5-27.6 GHz spectrum without the requirement to protect future Upper Microwave Flexible Use Service ("UMFUS") operations.[3]

In response to a request from the Commission staff, O3b provides the analysis below regarding the specific factors of Section 25.136(a)(4). The analysis demonstrates that the O3b proposal to add the 27.5-27.6 GHz frequency band to the Hawaii Gateway without the obligation to protect UMFUS networks is fully consistent with the rule's provisions. To the extent the Commission disagrees, O3b reiterates its request for a waiver of Section 25.136 because O3b's use of the additional frequencies will serve the public interest and will not meaningfully affect the deployment of terrestrial services in Honolulu County.

§ 25.136(a)(4)(i)

The Hawaii Gateway complies with Section 25.136(a)(4)(i), which states that an earth station can avoid the obligation to provide interference protection to UMFUS licensees only if the county where it is located contains no more than two other earth stations that are exempt from UMFUS protection requirements under Section 25.136(a). In determining whether this limit is met, "multiple earth stations that are collocated with or at a location contiguous to each other shall be considered as one earth station."[4]

A search of the International Bureau Filing System as of June 19, 2019, indicates that a total of four Honolulu County earth station licenses authorize use of frequencies in the 27.5–28.35 GHz band (the "UMFUS band"), including a second O3b earth station and two licenses held by other parties. Three of these UMFUS band earth stations were licensed prior to July 14, 2016, and are therefore grandfathered under Section 25.136(a)(2). The remaining earth station,

[1] *O3b Limited,* Call Sign E100088, File No. SES-MOD-20190207-00084 ("Hawaii Gateway Modification").
[2] *See id.,* Exhibit 1 at 2.
[3] *See id.* at 5-7.
[4] 47 C.F.R. § 25.136(a)(4)(i).

Call Sign E150010 held by Hawaii Pacific Teleport L.P. ("HPT"), was licensed after July 14, 2016 based on a demonstration of compliance with Section 25.136(a)(4).[5]

The table below provides the details of these earth station licenses:

Licensee	Call Sign	Coordinates	Licensed UMFUS Band Frequencies
Hawaii Gateway	E100088	21° 40' 17.8" N.L.; 158° 1' 54.9" W.L.	27.6- 28.35 GHz
O3b	E140107	21° 40' 17.8" N.L.; 158° 1' 54.9" W.L.	27.6- 28.35 GHz
ViaSat, Inc.	E110046	21° 20' 9.6" N.L.; 158° 5' 25.5" W.L.	28.1-28.35 GHz
Hawaii Pacific Teleport, L.P.	E150010	21° 20' 12.0" N.L.; 158° 5' 25.2" W.L.	27.5- 28.35 GHz

The license parameters demonstrate that the authority requested in the Hawaii Gateway Modification is consistent with the limits in Section 25.136(a)(4)(i). The two O3b earth stations are collocated at the same coordinates, and the coordinates of the other two earth stations are nearly identical.[6] As a result, each pair of call signs counts as a single earth station under the explicit language of Section 25.136(a)(4)(i). Moreover, as noted above, O3b is seeking in the modification to add the 27.5-27.6 GHz spectrum to the UMFUS Band frequencies for which the earth station is already licensed, and only the HPT earth station is currently authorized for the 27.5-27.6 GHz segment.

Thus, adding the 27.5-27.6 GHz frequencies to the Hawaii Gateway license is fully compliant with the provisions of Section 25.136(a)(4)(i), as there are not more than two grandfathered earth stations authorized to use that band segment.

§ 25.136(a)(4)(ii)

The Hawaii Gateway Modification satisfies the population limits in Section 25.136(a)(4)(ii) as well. That rule provision states that the area within which an earth station's power flux density ("PFD") at ten meters above ground level is equal to or exceeds −77.6 dBm/m^2/MHz must not cover more than a specified proportion of a county's population. For counties with more than 450,000 residents, the applicable limit on PFD contour coverage for all earth stations authorized under Section 25.136(a) is 0.1% of the local population.[7] The Hawaii Gateway complies with this cap.

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[5] *See Hawaii Pacific Teleport, L.P.,* Call Sign E150010, File No. SES-MFS-20170721-00787 ("HPT Application") at Attachment C, granted Jan. 16, 2018.

[6] Based on their coordinates, the Hawaii Pacific Teleport and ViaSat earth stations are separated by less than 0.05 miles using the Great Circle method of computation referenced on the Commission's website. *See* https://www.fcc.gov/media/radio/distance-and-azimuths. The HPT Application confirms that HPT's antenna is collocated with that of ViaSat. *See* HPT Application, Attachment C at 1 (noting that HPT's earth station "is collocated with the ViaSat earth station site").

[7] 47 C.F.R. § 25.136(a)(4)(ii).

According to the 2010 census, Honolulu County has a population of 953,207,[8] permitting earth stations authorized under Section 25.136(a) to cover up to 953 people in the county. The below analysis shows that the Hawaii Gateway's PFD contour will cover only 75 people.

In this analysis, we have assumed the ITU-R P.452 propagation model and used 1-arc second resolution Shuttle Radar Topography Mission ("SRTM") data. The population data for each census block within the PFD contour is from the 2010 U.S. census data. The proportional method was used to assess how many people in a given census block are within the PFD contour.

The earth station parameters are shown in the following table.

Parameter	**Value**
ES latitude	21° 40' 17.8" N.L.
ES longitude	158° 1' 54.9" W.L.
ES antenna size	7.3 meters
ES input power spectral density	−9.3 dBW/MHz
ES antenna pattern	ITU-R S.580
ES minimum elevation angle	5 degrees

The Visualyse PRO software by Transfinite was used to develop a composite PFD contour using the above assumptions. The earth station input power spectral density used in the simulation differs from the value contained in the application. This is to account for nominal operations under clear-sky conditions and also assumes that the antenna pattern will achieve at least 1 dB better discrimination than the ITU antenna pattern and 2 dB of additional losses due to clutter near the transmitting FSS earth station and/or the victim UMFUS station. Once the contour was developed, Matlab was used to read the PFD contour, the census block contours, and census block population to determine the intersection of the PFD contour with each census block. The percent of the intersecting area of a given census block was multiplied by the total population of that census block to determine the proportional population within the PFD contour. The resulting contour of intersecting PFD and census blocks with population greater than 0 were exported to KML format and imported to Google Earth for visualizing the final contour. The following graphic illustrates this contour.

[8] *See* QuickFacts Honolulu County, Hawaii, United States Census Bureau, available at: https://www.census.gov/quickfacts/fact/table/hawaiicountyhawaii/PST045216. More recent information suggests that the population is currently higher, but O3b is using the census value as a conservative estimate.

The actual population covered is as follows:

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Block ID: 150039900010027; Population: 0
Block ID: 150039900010002; Population: 0
Block ID: 150030101001007; Population: 0
Block ID: 150030101002008; Population: 3.9
Block ID: 150030101003030; Population: 1.5
Block ID: 150030101003013; Population: 0
Block ID: 150030101001010; Population: 16.5
Block ID: 150030101001016; Population: 51.5
Block ID: 150030100001024; Population: 0
Block ID: 150030101003001; Population: 1.7
Block ID: 150039900010028; Population: 0
Population covered: 75.1
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As discussed above, only one other earth station in Honolulu County, HPT's call sign E150010, is authorized to operate in the 27.5-27.6 GHz band segment requested in the Hawaii Gateway Modification. The Section 25.136 compliance showing HPT submitted when it added the UMFUS Band frequencies shows that the population within the relevant PFD contour of the E150010 earth station is zero.[9]

Based on these calculations, the total population covered by the Hawaii Gateway's PFD contour and that of the existing E150010 earth station in the 27.5-27.6 GHz frequencies is 75, well below the applicable limit of 953. Accordingly, the requirements of Section 25.136(a)(4)(ii) are met.

§ 25.136(a)(4)(iii)

Similarly, the Hawaii Gateway's PFD contour conforms to the limitations in Section 25.1136(a)(4)(iii). O3b has performed a search in Google Earth to confirm that there are no major event venues, urban mass transit routes, passenger railroads, cruise ship ports or major roadways within the Hawaii Gateway's PFD contour. The PFD contour does overlap with portions of Route 83 in Honolulu County, but Route 83 is not identified as an Interstate, Other Freeway and Expressway, or Other Principal Arterial by The Federal Highway Administration Office of Planning, Environment, and Realty Executive Geographic Information System map.[10] As a result, that road does not come within the prohibitions of Section 25.136(a)(4)(iii).

§ 25.136(a)(4)(iv)

Finally, no coordination of the Hawaii Gateway Modification is required under Section 25.136(a)(4)(iv). That rule provision specifies that the earth station applicant must successfully complete coordination within its relevant PFD contour with respect to any "existing facilities constructed and in operation by the UMFUS licensee."[11] The Commission has announced the winning bidders for UMFUS authority resulting from the 28 GHz auction completed earlier this year,[12] but no UMFUS facilities have yet been constructed and commenced operations in Honolulu County. Accordingly, the requirement in Section 25.136(a)(4)(iv) to coordinate with UMFUS operations within the Hawaii Gateway's PFD contour has not been triggered.

Waiver Request

Based on the above analysis, the Hawaii Gateway Modification meets each element of Section 25.136(a)(4), and O3b should be authorized to use the 27.5-27.6 GHz band segment without being required to protect future UMFUS operations in that spectrum. In the event the Commission disagrees with O3b's conclusion, however, O3b renews its request for waiver of

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[9] HPT Application, Attachment C.
[10] *See* U.S. Department of Transportation, Federal Highway Administration, National Highway System map. Available at: https://hepgis.fhwa.dot.gov/fhwagis/.
[11] 47 C.F.R. § 25.136(a)(4)(iv).
[12] *See* Public Notice, Winning Bidders Announced for Auction of 28 GHz Upper Microwave Flexible User Service Licenses (Auction 101), DA-19-484 (June 3, 2019).

Section 25.136(a)(4) as needed to allow use of that band segment without an interference protection obligation. As discussed in detail in the Hawaii Gateway Modification, grant of such waiver is consistent with Commission precedent and would serve the public interest, as O3b will be able to provide valuable customer services in this spectrum segment that is unlikely to be used for UMFUS operations.[13]

[13] Hawaii Gateway Modification, Exhibit 1 at 5-7.