

April 12, 2019

VIA ELECTRONIC FILING

Hung Le
Experimental Licensing Branch Chief, Office of Engineering and Technology
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: Request for Further Information; Call Sign WN9XBH; File No. SAT-0239-EX-ST-2019

Dear Mr. Le:

O3b Limited (“O3b”) files this letter in response to a request for further information regarding its pending application for special temporary authority to conduct tests of a new GetSat MicroSat terminal at the SES facility in Manassas, VA. SES has provided its answers to the Commission’s inquiries below:

1) Please explain that the result of EPFD provided in the Annex Revision is generated based on what frequency band, emission and power levels? Is the result EPFD for an individual transmission?

The EPFD analysis previously provided is not based on a specific transmission. It is intended to reflect the maximum input power allowed (which is always less than the maximum of 20 W) that can be used for any carrier bandwidth such that the resulting power flux-density at the GSO arc is below the limit. The frequency range is 27.6-28.4 GHz. Notably, there is a single EPFD limit in portions of the 27.5-30 GHz frequency range.

2) Please provide the detail calculation, data/number/value and formula that you used to calculate the EPFD for each frequency band, emissions (50MG7D and 6M00G7D) and its associated power.

Please see Annex A for a detailed calculation of how O3b determined that the values put forth in the application will meet the EPFD levels in Table 22-2 of Article 22, Section II, and Resolution 76 of the ITU Radio Regulations.

3) Please certify that your proposed operations and communication between earth stations and satellites are in compliance with all existing or future coordination agreements between the proposed satellite operators and other GSO and NGSO satellite networks.

O3b certifies that its proposed operations will comply with all existing or future coordination agreements between O3b and other satellite operators and will abide by all the terms and conditions of the O3b Market Access Grant.¹ In addition, as stated in its application, O3b will coordinate with local terrestrial operators prior to transmitting in any bands that are shared with terrestrial services.

Respectfully submitted,

SES Networks

/s/ Will Lewis

Will Lewis

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cc: Paul Blais

Attachment

¹ *O3b Limited*, Order and Declaratory Ruling, Call Sign S2935, FCC 18-70 at ¶ 20 (rel. June 6, 2018).

Annex A: Calculation of Getsat Microsat compliance with EPFD ↑ limits

The below formula for calculating EPFD is defined in 22.5C.1 in the Radio Regulations:

$$epfd = 10 \log_{10} \left[\sum_{i=1}^{N_u} 10^{\frac{P_i}{10}} \cdot \frac{G_r(\theta_i)}{4 \pi d_i^2} \cdot \frac{G_r(\phi_i)}{G_{r,max}} \right]$$

Article 22.5 defines the EPFD limit in the requested frequencies is -162 dBW/m²/40 kHz.

For this calculation, we assume the GETSAT antenna is located at the SES testing facility around 37.8N, 77.5W and pointing to an O3b satellite at 55W. The O3b satellites move relative to the earth station and this static case was chosen for illustrative purposes. For each point along the O3b arc, the GETSAT antenna will meet the EPFD limit.

Using the above equation, SES assumes an input power spectral density of -58 dBW/Hz or -12 dBW/40 kHz. The GETSAT antenna varies in the direction of the GSO arc but the maximum gain in the direction of the GSO arc is 9.7 dBi.

The spreading loss ($4 \cdot \pi \cdot d^2$), in the log scale, in the direction of the GSO arc at the peak off-axis gain of the GETSAT antenna is 162.5 dB.

Finally, we assume the GSO satellite victim's antenna peak gain is located at the SES testing facility site. This ensures that there is no discrimination advantage at the GSO satellite receiver.

With this assumption, the last term of the EPFD calculation becomes one since $G_r(\phi_i) = G_{r, max}$. Therefore, SES has defined all parameters the EPFD uplink (in log scale) is:

$$epfd = -12 \text{ dBW/40 kHz} + 9.7 \text{ dBi} - 162.5 \text{ dB} = -164.8 \text{ dBW/m}^2/40 \text{ kHz}$$

This is 2.8 dB below the limit of -162 dBW/m²/40 kHz.

When considering the specific emissions identified, 50MG7D and 6M00G7D, SES could operate the 50 MHz carrier at full power, 20 W, and only achieve -18 dBW/40 kHz input power spectral density. This will have approximately 8.8 dB of margin below the EPFD limit. For the 6 MHz carrier, SES cannot and will not operate at full power, 20 W and will operate with some amount of output backoff. Because of the narrower width of this carrier, a full power input would not be necessary. SES will, at the least, operate minimum with the minimum output backoff required to be compliant with EPFD uplink limits which is approximately 1 dB.