

From: Mariah Shuman

To: Nimesh Sangani

Date: May 28, 2019

Subject: Additional Information Request

Message:

(3) Please demonstrate that your proposed operations in the 14.0-14.5 GHz frequency band via WorldVu Satellites Limited ("OneWeb")'s NGSO satellites will be in compliance with the equivalent power Flux-density limit (-160 dBW/m²/40 KHz) in Article 22.5D of the ITU Radio Regulations (see Annex B of attachment and O3b Limited's efd demonstration in its experimental application 0712-EX-ST-2019 for reference).

While the peak EIRP density of the experimental user terminals may be as high as 20 dBW/40 KHz at their boresights, the OneWeb system will never allow its earth stations to radiate directly at the GSO arc. In fact, no OneWeb user terminal will orient its boresight within 6° of the GSO arc at any time.

When taking into consideration the off-axis gain pattern of the experimental user terminals, the maximum EIRP density that will be radiated towards a victim satellite at any point on the GSO arc would be -6.5 dBW/40 KHz. The minimum spreading loss, in the log scale, from a single experimental user terminal in the United States to the GSO arc is equal to $-10 \cdot \log(4 \cdot \pi \cdot D^2)$, or -162.2 dB/m², where D is 36,500 km. Thus, the maximum EPFD at any GSO victim satellite would be no more than:

$-6.5 \text{ dBW/40 KHz} - 162.2 \text{ dB/m}^2 = -168.7 \text{ dBW/m}^2/40 \text{ KHz}$.

The EPFD limit in the Ku-band is -160 dBW/m²/40 KHz. In theory, this means that multiple experimental user terminals could operate at maximum EIRP and minimum GSO avoidance angle from the same location, and still result in acceptable EPFD at a victim GSO satellite. Regardless of the number of experimental user terminals at a single location, each experimental user terminal at the test site would be operating on a different channel to avoid co-interference, and therefore would result in little-to-no aggregation in a given 40 kHz reference band. As such, there will be significant margin in the resultant EPFD levels with respect to the operation of OneWeb's experimental user terminals described in this application.

(4) Please provide the detail calculation, data/number/value and formula that used to calculate the EPFD for the 14.0-14.5 GHz frequency band, emissions (20M0G7D and 40M0G7D) and its associated powers (2.22kW (ERP) and 4.42kW (ERP)).

Please see response to Question 3 above.

(5) Please certify that your proposed operations and communication between earth stations (user terminals) and satellites are in compliance with all existing and future coordination agreements between United Kingdom and other administrations, GSO and NGSO satellite operators.

OneWeb certifies that the proposed operations and communications will be in compliance with all existing and future coordination agreements between the United Kingdom and other administrations, GSO, and NGSO satellite operators.