

May 2, 2016

**Via Electronic Filing**

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street SW  
Washington, DC 20554

**Re: Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, GN Docket No. 14-177, IB Docket Nos. 15-256 & 97-95; RM-11664; and WT Docket No. 10-112**

Dear Ms. Dortch:

This *ex parte* letter responds to the April 21, 2016 *ex parte* filed in this proceeding by Verizon, Samsung, QUALCOMM, Intel, Nokia and Ericsson (“5G Parties *ex parte*”)<sup>1</sup> and subsequent *ex partes* filed by individual and other groups of companies on the same topics.

As an initial matter, it bears emphasis that ViaSat (and others in the satellite industry) are actively in discussions with representatives of the wireless industry and that the information contained in this *ex parte* is part of those discussions. ViaSat submits this letter in order to ensure the continued completeness of the record in light of the 5G Parties *ex parte*.

Any given proposal for 5G operations likely affects one of the four interference paths that must be analyzed and addressed in order to ensure successful sharing between 5G and satellite services in the same spectrum band:

---

<sup>1</sup> *Ex Parte* Submission by Verizon, Samsung Electronics of America, Qualcomm Incorporated, Intel Corporation, GN Docket No. 14-177, *et al.* (filed Apr. 21, 2016).

- Path 1: 27.5-28.35 GHz---Aggregate emissions from 5G base stations and user devices in the Earth-to-space direction into the uplink receivers at the satellites;
- Path 2: 27.5-28.35 GHz---Emissions from satellite uplink earth stations into 5G base stations and user device receivers on the Earth;
- Path 3: 37.5-40.0 GHz---Emissions from 5G base stations and user devices into satellite downlink earth stations on the Earth; and
- Path 4: 37.5-40.0 GHz---Emissions from satellite downlinks from space into 5G base stations and user devices on the Earth.

The 5G Parties *ex parte* suggestion to increase the power level of 5G base stations and semi-stationary moveable devices above that proposed in the NPRM affects Path 1. The 5G Parties claim that the NPRM level would result in “the range of base stations . . . much smaller than with similar power levels in existing mobile bands” and movable devices “could be used for narrow-beam transmissions between localized devices.”

Unfortunately, this proposal does not take into account, or even acknowledge, (i) that the 27.5-28.35 GHz band segment currently is shared with satellites that have been designed in reliance on the existing designated uses of this band, or (ii) that the Commission clearly intends that the terrestrial mobile systems sharing criteria be developed by taking satellite network operations into account.

ViaSat’s primary concern with this proposal is not the proposed 5G power level in and of itself, but rather is (i) the absence of any stated plan or mechanism for managing the aggregate unwanted energy that will be directed toward space and the resulting unwanted

energy arriving at a satellite's location under Path 1, and (ii) the likely resulting harmful interference to satellite receivers under Path 1.

The technical analysis that ViaSat submitted into the record on April 21, 2016 provides significant detail about the aggregate unwanted energy from 5G transmissions that satellite receivers can tolerate.<sup>2</sup> The aggregation of this unwanted energy from 5G operations (particularly at the escalated power levels that the 5G Parties have proposed) is a complex dynamic that must take into account a number of factors, including the effect of possible forward scatter from dense metallic objects near 5G transmitters (*e.g.* a dense group of automobiles).<sup>3</sup>

Again, in order to facilitate shared use of 27.5-28.35 GHz and 37.5-40.0 GHz, both the satellite interests and 5G interests must work together to address all four of the paths outlined above. The 5G Parties *ex parte* ignores these issues and focuses only on achieving 5G coverage that is comparable to lower bands. It is not clear at this point whether the physics of these higher bands or the sharing requirement the Commission has supported will ultimately allow 5G base stations to have the same coverage as cellular, PCS or AWS base stations.

ViaSat is involved in ongoing technical discussions and committed to working with the Commission and all parties to explore potential sharing solutions that will promote deployment of 5G alongside existing and future satellite networks in the 27.5-28.35 GHz and 37.5-40.0 GHz bands. Some solutions may require innovative antenna technology or

---

<sup>2</sup> ViaSat, Inc., Notice of *Ex Parte* Presentation, GN Docket No. 14-177; IB Docket Nos. 15-256 & 97-95; RM-11664; and WT Docket No. 10-112 (filed Apr. 21, 2016).

<sup>3</sup> Mathematically this is similar to the issue of bistatic radar cross section of automobiles illuminated from above.

other sharing techniques for the 5G operations, but because of the long lead time for 5G deployment, there is time for flexibility of 5G network designs. ViaSat is open to considering such approaches but needs the the 5G Parties' engagement as well.

Respectfully submitted,

/s/

Christopher J. Murphy  
Associate General Counsel, Regulatory