

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Facilitating the Communications of Earth	)	IB Docket No. 18-315
Stations in Motion with Non-Geostationary	)	
Orbit Space Stations	)	

**REPLY OF VIASAT, INC.**

Viasat, Inc. (“Viasat”) replies to the comments filed in response to the proposals in the above-captioned proceeding, which seeks to allow the operation of earth stations in motion (“ESIMs”) with non-geostationary orbit (“NGSO”) satellites operating in the fixed-satellite service (“FSS”).<sup>1</sup> Satellite operators in this proceeding unanimously support the adoption of rules to allow ESIMs to operate within NGSO FSS networks, and agree that ESIMs should be authorized in the proposed Ku and Ka band frequencies. Commenters also favor the Commission’s proposals to adopt a regulatory framework for NGSO ESIMs that is analogous to that recently adopted for GSO ESIMs. In addition, SES and O3b (jointly “SES”) acknowledge that NGSO ESIMs operate globally in a broader range of the Ka band, including in the 27.5-28.35 GHz band, which Viasat urged the Commission to consider for NGSO ESIMs in this proceeding. Finally, existing Commission rules provide adequate protection for passive scientific observations, and thus, NGSO ESIM operations should not be subject to any of the additional restrictions or requirements proposed by the National Academy of Sciences.

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<sup>1</sup> *Facilitating the Communications of Earth Stations in Motion with Non-Geostationary Orbit Space Stations*, IB Docket No. 18-315, Notice of Proposed Rulemaking, FCC 18-160 (rel. Nov. 16, 2018) (“*Notice*”).

## **I. THERE IS BROAD SUPPORT FOR NGSO ESIMS IN THE KU AND KA BANDS**

Commenters in this proceeding are overwhelmingly in favor of the Commission's proposals to allow ESIMs to operate with NGSO FSS systems in the 10.7-11.7 GHz, 11.7-12.2 GHz, and 14.0-14.5 GHz portions of the Ku band, and the 18.3-18.6 GHz, 18.8-19.3 GHz, 19.3-19.4 GHz, 19.6-19.7 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz, 28.6-29.1 GHz, 29.5-30 GHz portions of the Ka band. The record affirms Viasat's comments regarding the ever-increasing consumer demand for high-bandwidth, ubiquitous mobile connectivity that satellite broadband services can deliver.<sup>2</sup> The Commission's proposals in the *Notice* are a key to satisfying such demand. Viasat agrees that the ubiquitous coverage inherent in NGSO systems are well suited for global ESIM operations,<sup>3</sup> and that expanding the regulatory framework adopted for GSO ESIMs to also include NGSO ESIMs will provide the certainty needed to promote innovation, advance mobile technologies for NGSO systems, and speed the deployment of services to consumers.<sup>4</sup>

Overall, the comments largely support the Commission's proposals to allow ESIMs to operate pursuant to the same regulatory status as fixed NGSO earth stations in each of the band segments identified in the *Notice*:<sup>5</sup> (i) primary at 18.8-19.3 GHz and 28.6-29.1 GHz; (ii) secondary with respect to GSO FSS operations at 11.7-12.2 GHz, 14.0-14.5 GHz, 18.3-18.6 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz and 29.5-30 GHz; (iii) secondary with respect to FS stations at 17.8-18.3 GHz, and (iv) unprotected with respect to FS stations at 10.7-11.7, 19.3-

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<sup>2</sup> See OneWeb Comments at 2-3; SES Comments at 2; ESIM Coalition Comments at 2.

<sup>3</sup> OneWeb Comments at 3.

<sup>4</sup> See SES Comments at 5; OneWeb Comments at 2, 13; Kymeta Comments at 2; Hughes Comments at 3.

<sup>5</sup> See, e.g., SES Comments at 7-8; ESIM Coalition Comments at 3-4.

19.4 GHz and 19.6-19.7 GHz. The NGSO ESIM operations proposed in the bands shared with FS would be co-primary with GSO FSS ESIM operations that are being proposed in those bands, and thus, NGSO ESIMs would be required to protect such GSO FSS operations.

With respect to the 11.7-12.2 GHz, 14.0-14.5 GHz, 18.3-18.6 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz and 29.5-30 GHz bands where NGSO systems must protect GSO operations, SES and the ESIM Coalition request that the footnote to the U.S. Table of Frequency Allocations (“U.S. Table”) allowing NGSO ESIMs specify that they do not cause “unacceptable interference” instead of “harmful interference.”<sup>6</sup> Viasat agrees and notes that the proposed rules in the *Notice* already specify the standard as “unacceptable interference.”<sup>7</sup> Commenters agree that NGSO ESIM operations in these bands should be compatible with GSO operations, consistent with the relative regulatory status of GSO and NGSO, and that NGSO FSS must protect GSO FSS operations through compliance with the applicable EPFD limits.<sup>8</sup>

Recognizing that GSO FSS operations are secondary in the 18.8-19.3 GHz and 28.6-29.1 GHz bands, Hughes proposes to limit NGSO ESIMs in these bands to status that is co-equal to GSO operations.<sup>9</sup> Given the inherent ability of ESIMs to operate within the same parameters and in a manner that is no more interfering than a fixed earth station, the Commission has adopted allocations for ESIMs in other bands as an application of the FSS with status co-equal to fixed earth stations. Therefore, Hughes’s proposed approach appears inconsistent with the Commission’s entire legal framework for ESIMs, and it is not clear why such a different approach would be warranted in this case. However, because NGSO and GSO operations are co-

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<sup>6</sup> See SES/O3b Comments at 7-8; ESIM Coalition Comments at 3.

<sup>7</sup> See *Notice*, App’x A at § 2.106 n.NG527A(c).

<sup>8</sup> See ESIM Coalition Comments at 2-4; Eutelsat Comments at 2; Boeing Comments at 6-7.

<sup>9</sup> See Hughes Comments at 4.

primary in these bands internationally, Viasat reemphasizes that any primary NGSO ESIM operations within the U.S. should not impact co-primary GSO operations outside of the U.S., where GSO and NGSO operations are subject to ITU coordination requirements.

Furthermore, Viasat agrees with the consensus among commenters that blanket licensing of ESIMs communicating within NGSO FSS networks should be permitted. Blanket licensing in this context is consistent with Commission precedent and overall efforts with respect to widely-deployed user terminals to promote administrative efficiency and reduce costs of licensing, both for applicants and the Commission, thereby speeding deployment of services.<sup>10</sup>

In addition, commenters generally agree that network monitoring and control requirements are essential to ensuring that NGSO FSS ESIMs are compatible with the operating environment.<sup>11</sup> SES proposes that Section 25.228 be modified to retain a separate NGSO-specific self-monitoring and network control requirement for ESIMs to ensure they comply with the authorized EIRP density. “The monitoring and network control requirements are consistent with the design of NGSO ESIM terminals and are necessary to ensure that such terminals operate consistent with their authorization.”<sup>12</sup> Viasat agrees that monitoring and network control requirements are critical to ensuring that NGSO ESIMs operate compatibly with other FSS operations, and that such requirements would not be burdensome for NGSO networks to maintain for ESIMs.

Kepler asks the Commission to clarify that NGSO satellite networks need not be controlled in “real-time” from a network control and monitoring center (“NCMC”) but “may

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<sup>10</sup> See ESIM Coalition Comments at 4-5; SES/O3b Comments at 10; OneWeb Comments at 9-10; Kymeta Comments at 2-3; Boeing Comments at 12-13.

<sup>11</sup> See, e.g., ESIM Coalition Comments at 5-6; Eutelsat Comments at 1, 3.

<sup>12</sup> SES/O3b Comments at 9.

instead rely either on Artificial Intelligence (“AI”) or predetermined rules in order to mitigate interference as it related to aggregate EIRP.”<sup>13</sup> Kepler contemplates that in some network architectures the satellite itself could operate as an “equivalent facility” that monitors each ESIM in the network. The Commission should clarify that any such mechanisms would need to be capable of receiving commands to disable transmissions, if circumstances require, within 100 milliseconds, consistent with the rules adopted for GSO ESIMs.<sup>14</sup>

Finally, Boeing, SES and OneWeb agree with Viasat that ESIMs will be no more complex than other NGSO operations and that no additional operational requirements on ESIM communications beyond the considerations in the *Notice* are necessary to facilitate coexistence with other NGSO systems.<sup>15</sup> Therefore, suitable NGSO rules should be sufficient to ensure NGSO ESIM operations are within the scope of authorizations.<sup>16</sup>

## **II. THE RECORD SUPPORTS CONSIDERATION OF ADDITIONAL FREQUENCIES FOR NGSO ESIM OPERATIONS**

As SES notes, since 2015, the European Communications Commission (“ECC”) has allowed earth stations on mobile platforms to operate with NGSO FSS systems across the Ka band, including at 17.3-20.2 GHz and 27.5-29.1 GHz.<sup>17</sup> In this regard, SES urges the Commission to adopt the proposals in the *Notice* to expand the benefits to consumers and the advances in mobile technology that already have been effectuated by the ECC decision. In addition, SES’s comments lend further support to Viasat’s request that the Commission consider

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<sup>13</sup> Kepler Comments at 2.

<sup>14</sup> See *Notice*, App’x A at § 25.228(c).

<sup>15</sup> See Boeing Comments at 2; SES/O3b Comments at 10-11; OneWeb Comments at 12.

<sup>16</sup> SES/O3b Comments at 11.

<sup>17</sup> See *id.* at 6.

expanding ESIMs into other segments of the 27.5-30 GHz band. As Viasat detailed in its opening comments, allowing NGSO FSS ESIM access in spectrum where ESIM deployment is demonstrated to be compatible with the primary allocated services—particularly in the 27.5-28.35 GHz band—would facilitate greater sharing of scarce spectrum resources to ensure that satellite networks have the spectrum needed to increase network capacity to levels required to meet consumer demands for ubiquitous connectivity.<sup>18</sup>

### **III. EXISTING RULES AND REQUIREMENTS FOR NGSO FSS NETWORKS ADEQUATELY PROTECT PASSIVE SERVICES**

The National Academy of Sciences, through its Committee on Radio Frequencies (“CORF”) raised concerns regarding potential interference to protected passive scientific observations in bands for satellite downlinks at 10.6-10.7 GHz and 18.6-18.8 GHz, and uplinks at 14.47-14.5 GHz. However, the Commission’s existing rules and designations in the U.S. Table already address NGSO FSS operations in these bands and are sufficient to protect the radio astronomy and remote sensing operations that CORF identifies in its comments. Thus, any additional requirements that CORF proposes are unnecessary.

As a threshold matter, in the 10.6-10.7 GHz and 18.6-18.8 GHz band operations that CORF identifies for the Radio Astronomy Service (“RAS”) and passive remote sensing Earth Exploration-Satellite Service (“EESS”), any NGSO FSS operations in or adjacent to these bands are in the downlink direction, *i.e.*, from the satellite down to the Earth. Therefore, ESIMs would only be operating in receive mode. Whether earth station terminals are fixed or mobile has no impact on the satellite downlink transmissions, and deployment of ESIMs would not warrant any new operational conditions.

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<sup>18</sup> See Viasat Comments at 7-8.

Transmissions from NGSO FSS spacecraft in or adjacent to these bands are already subject to coordination requirements and protection criteria. NGSO FSS systems in the 10.7-11.7 GHz band must coordinate operations with RAS observatories “to achieve a mutually acceptable agreement regarding the protection of the radio telescope facilities operating in the band 10.6-10.7 GHz.”<sup>19</sup> Further, the Commission’s recent grants of authority for NGSO FSS networks already require such coordination and are conditioned upon compliance with the footnotes in the U.S. Table.<sup>20</sup> Therefore, there is no reason to restrict satellite emissions or implement a 25 MHz guard band around 10.68-10.7 GHz, as CORF proposes.<sup>21</sup>

With respect to EESS operations in the 18.6-18.8 GHz band, NGSO frequencies proposed for ESIMs include only the adjacent 18.3-18.6 GHz and 18.8-19.3 GHz bands. CORF recognizes this fact and simply notes that the ITU Recommendation RS.2017 threshold for interference at 18.6-18.8 GHz is -163 dBW and less than 0.1 percent of the time/area, but does not propose any specific restrictions or limitations.<sup>22</sup> Viasat acknowledges that such limits already apply and would be observed by NGSO FSS systems.

With respect to RAS observations at 14.47-14.5 GHz, CORF requests that NGSO ESIM uplinks at 14.0-14.5 GHz be subject to the same coordination requirement with RAS observatories in the 14.47-14.5 GHz that GSO ESIMs are subject to under Section 25.228(j).<sup>23</sup> The Commission’s proposed rules in the *Notice* would apply this coordination requirement to

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<sup>19</sup> 47 C.F.R. § 2.106, n.US131; *see also id.* at n.US211.

<sup>20</sup> *See, e.g., WorldVu Satellites Limited*, IBFS File No. SAT-LOI-20160528-00041, Call Sign S2963, Order and Declaratory Ruling, FCC 17-77, ¶ 24b (rel. June 23, 2017) (“*OneWeb Grant*”).

<sup>21</sup> *See* CORF Comments at 12.

<sup>22</sup> *See id.* at 13.

<sup>23</sup> *See id.* at 10-11.

NGSO ESIMs, and Viasat agrees that such a requirement would be reasonable. Moreover, NGSO FSS systems already are subject to requirements in the U.S. Table to take all practicable steps to protect the radio astronomy service from harmful interference.<sup>24</sup>

#### IV. CONCLUSION

For the foregoing reasons, and as stated in Viasat's opening comments, Viasat urges the Commission to adopt its proposals to expand the ESIM rules to allow operations with NGSO FSS networks. Moreover, the time is ripe to begin consideration of NGSO ESIMs in additional bands, including the 27.5-28.35 GHz portion of the Ka band. Finally, NGSO ESIM operations would be compatible with passive RAS and EESS operations, and thus, no additional requirements or restrictions are necessary to protect those services.

Respectfully submitted,

/s/

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<sup>24</sup> See 47 C.F.R. 2.106 n.US342; see also *OneWeb Grant* at ¶ 24a.