

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Amendment of Parts 2 and 25 of the Commission's Rules)	IB Docket No. 17-95
to Facilitate the Use of Earth Stations in Motion)	
Communicating with Geostationary Orbit Space Stations in)	
Frequency Bands Allocated to the Fixed Satellite Service)	

REPLY COMMENTS OF SES S.A. AND O3B LIMITED

SES S.A. ("SES") and its subsidiary O3b Limited ("O3b"), hereby reply to the comments of other parties in response to the Notice of Proposed Rulemaking in the above-captioned proceeding.¹ As discussed herein, the Commission should adopt policies to facilitate the deployment of Earth Stations in Motion ("ESIMs") with both geostationary orbit ("GSO") and non-geostationary orbit ("NGSO") Fixed-Satellite Service ("FSS") systems across a broad range of frequencies. The Commission need not implement any special protections with respect to terrestrial, Radio Astronomy Service ("RAS"), or Earth Exploration-Satellite Service ("EESS") operations but must ensure that it has the necessary tools to manage any adjacent satellite interference issues as ESIM usage increases.

I. THE RECORD SUPPORTS PERMITTING ESIM OPERATIONS WITH NGSO AS WELL AS GSO SATELLITE NETWORKS

The SES/O3b Comments highlight the companies' unique position as operators of GSO and NGSO satellite fleets and emphasize the importance of expedited Commission action

¹ *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service*, Notice of Proposed Rulemaking, IB Docket No. 17-95 (rel. May 19, 2017) (the "Notice").

to establish rules enabling ESIM communications with both types of satellite systems.² In its filing, Telesat Canada agrees that the Commission should initiate “an NGSO FSS ESIM proceeding at the earliest practical date.”³

Such steps are needed to ensure that U.S. customers and U.S. antenna manufacturers are not placed at a disadvantage given that other countries are already laying the regulatory foundation for use of multi-band, multi-orbit antennas.⁴ The design of such terminals is well under way in response to marketplace demand, and Commission delay will do nothing to alter that progress.⁵ As Telesat notes, “most NGSO systems will operate worldwide,”⁶ and the absence of Commission rules will simply lead equipment manufacturers to look to policies adopted elsewhere to set the standards for NGSO ESIM communications.

Thus, customer demand will drive development and deployment of ESIMs designed to work with NGSO as well as GSO systems – the only question is whether U.S. end users will be able to take advantage of these state-of-the-art terminals. At a minimum, the Commission should act quickly to propose rules specifying that ESIMs operating with NGSO satellites in the 18.8-19.3 GHz and 28.6-29.1 GHz NGSO-primary bands are an application of the FSS and seek comment on ESIM licensing rules for operations with NGSO satellites in this

² Comments of SES S.A. and O3b Limited, IB Docket No. 17-95, filed July 31, 2017 (“SES/O3b Comments”) at 1-6.

³ Comments of Telesat Canada, IB Docket No. 17-95, filed July 31, 2017 (“Telesat Comments”) at 3 n.4.

⁴ See SES/O3b Comments at 4-5 & nn.11-12 (discussing actions by the European Electronic Communications Committee and European Telecommunications Standards Institute to define operating parameters for earth stations on mobile platforms using NGSO systems in Ka-band spectrum and to study appropriate rules for Ku-band NGSO ESIMs).

⁵ See *id.* at 3-4.

⁶ Telesat Comments at 3.

spectrum.⁷ Annex 1 of the SES/O3b Comments suggests specific language on these matters, and the Commission can review the European decisions for additional guidance.

This approach will put Ka-band ESIMs communicating with NGSO satellites on the same footing as is proposed in the Notice for terminals using GSO satellites in Ka-band spectrum where GSO networks are primary. By developing the regulatory framework for ESIMs to use NGSO as well as GSO networks, the Commission will ensure that U.S. customers have access to a complete array of options to meet their mobility needs.

II. MAKING A WIDE RANGE OF FREQUENCIES AVAILABLE FOR ESIM OPERATIONS WILL SERVE THE PUBLIC INTEREST

The record also reinforces the benefits of permitting ESIM operations in a broad range of Ku- and Ka-band frequencies. The SES/O3b Comments demonstrate that allowing reception by ESIMs of downlink signals in the 10.7-10.95 GHz and 11.2-11.45 GHz Appendix 30B extended Ku-band frequencies and the 17.8-18.3 GHz portion of the Ka-band will meet demand for ESIM operations both within and outside the United States without adversely affecting other spectrum users. Moreover, there is strong support for allowing ESIM use of the 29.25-29.3 GHz segment of the conventional Ka-band.

Expanding the downlink spectrum available to ESIMs to include the 10.7-10.95 GHz and 11.2-11.45 GHz is consistent with applicable precedent, as the Commission has previously granted authority for earth stations aboard aircraft (“ESAAs”) and earth stations aboard vessels (“ESVs”) to use these band segments.⁸ In its pending proceeding regarding NGSO operations in Ka-band frequencies, the Commission has proposed allowing FSS use of

⁷ See *id.* at 5. As noted in the SES/O3b Comments, this spectrum is designated for blanket licensing and is not shared with terrestrial services. *Id.* at 5-6 & nn.14-15.

⁸ See *id.* at 7 & n.23.

the 17.8-18.3 GHz band for downlinks by both GSO and NGSO systems,⁹ and that change would lay the groundwork for ESIM operations in this spectrum as well. In all these band segments, there are power flux density limits in place to protect terrestrial uses.¹⁰ Annex 1 to the SES/O3b Comments supplies proposed language to specify that ESIM operations in the 10.7-10.95 GHz, 11.2-11.45 GHz, and 17.8-18.3 GHz bands are an application of the FSS and are authorized to operate domestically on an unprotected basis vis-à-vis terrestrial networks.

Other commenters join SES and O3b in urging the Commission to include the 29.25-29.3 GHz band in the spectrum available for ESIM operations subject to coordination with Iridium's limited number of feeder link facilities.¹¹ These filers emphasize that "ESIM operations will be consistent with those of fixed earth stations, and the potential for interference to NGSO MSS feeder links will be controlled by the same coordination conditions as those for fixed earth stations."¹² Indeed, ViaSat points out that the 29.25-29.3 GHz spectrum has been available for blanket licensing for more than twenty years, and "the Commission has already licensed at least six million such earth stations on a shared basis with Iridium."¹³

In its comments, Iridium repeats its objections to allowing ESIMs to use this band segment but vastly overstates the difficulty of coordinating ESIM operations with the few Iridium feeder link sites that use this spectrum. Specifically, Iridium argues that sharing between ESIMs and the Iridium NGSO system creates "a uniquely complex and unpredictable

⁹ *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Notice of Proposed Rulemaking, 31 FCC Rcd 13651 (2016) at ¶ 9.

¹⁰ See SES/O3b Comments at 7 n.22, 8 & n.26.

¹¹ See *id.* at 9-10 & nn.32-34; see also Comments of Inmarsat Inc., IB Docket No. 17-95, filed July 31, 2017 ("Inmarsat Comments") at 5-6; Comments of ViaSat, Inc., IB Docket No. 17-95, filed July 31, 2017 ("ViaSat Comments") at 9-10.

¹² Inmarsat Comments at 6; see also ViaSat Comments at 9.

¹³ ViaSat Comments at 10.

interference environment that cannot be managed by established spectrum sharing strategies.”¹⁴ The evidence, however, does not support this assertion.

In particular, although Iridium alleges that the fact that its feeder link earth stations are tracking moving NGSO satellites makes it difficult to define an “interference reception zone,” it goes on to undercut its own argument by including figures that depict such zones.¹⁵ Iridium acknowledges that when it coordinates with GSO operators, the parties agree on a “geographic exclusion region,” and as “long as the GSO operator locates its fixed-location earth stations outside of the geographic exclusion region, Iridium’s feeder links will be adequately protected.”¹⁶ Iridium never explains why this exact approach cannot also be used with respect to ESIMs, at least for ESVs and vehicle-mounted earth stations (“VMESs”). Iridium also exaggerates the difficulty of coordinating with ESAAs. Iridium claims that “there is no obvious way to define a three-dimensional interference reception zone that extends into the airspace above the Iridium gateway,” but includes a figure showing such a zone.¹⁷

Significantly, Iridium ignores the fact that the Commission has experience protecting NASA TDRSS earth station sites and RAS observatories from interference from all types of ESIM terminals today. As the SES/O3b Comments observe, the current Part 25 rules for each category of ESIM terminals contain provisions prohibiting operation in the relevant Ku-band segments within radio line-of-sight of the TDRSS and RAS facilities until coordination has been completed.¹⁸ There is no reason the Commission cannot similarly specify an area

¹⁴ Comments of Iridium Satellite LLC, IB Docket No. 17-95, filed July 31, 2017 at 1.

¹⁵ *See id.* at 12 & Figures 1a and 1b.

¹⁶ *Id.* at 12.

¹⁷ *See id.* at 17 & Figure 3.

¹⁸ SES/O3b Comments at 10 n.34.

surrounding the existing Iridium feeder link sites within which coordination with Iridium would be required before an ESIM licensee can commence operations in the 29.25-29.3 GHz range.

Such an approach is particularly appropriate given the limited number of Iridium feeder link earth stations with operations in this band segment. There are only two such sites in the contiguous United States (“CONUS”), both in Arizona within relatively close proximity of each other.¹⁹ Even a generous exclusion zone such as that depicted in Figure 1b of the Iridium Comments would not prevent ESIM use of the 29.25-29.3 GHz spectrum on the roads and waterways of, and the airspace above, the vast majority of CONUS. In contrast, excluding the 29.25-29.3 GHz band from the spectrum available for ESIMs, as Iridium requests, would unnecessarily constrain the use of frequencies over this significant portion of the country in order to protect two feeder link sites. That outcome would clearly be contrary to the public interest.

III. NO ADDITIONAL MEASURES ARE NEEDED TO PROTECT TERRESTRIAL, RAS, OR EESS OPERATIONS

The record here demonstrates that there is no justification for constraining ESIM networks to protect non-FSS operations. Existing Commission rules confer all the protection to which terrestrial, RAS, or EESS systems are entitled under applicable spectrum policies.

First, a number of commenters echo the observation in the SES/O3b Comments that in the conventional Ka-band frequencies, terrestrial fixed or mobile services are not due any protection from satellite networks because there is no allocation for terrestrial networks in those bands.²⁰ For the same reason, the Commission must reject the Elefante Group’s suggestion that limitations should be imposed on ESIMs using conventional Ka-band spectrum in order to ensure compatibility with possible future use of the frequencies by ground terminals

¹⁹ See *Iridium Constellation LLC*, Call Signs E960244 (Chandler, AZ) and E960131 (Tempe, AZ).

²⁰ SES/O3b Comments at 9; *see also* Telesat Comments at 4; ViaSat Comments at 10-11.

communicating with stratospheric platforms.²¹ SES and O3b agree that a satellite terminal on one of the planned platforms receiving a downlink signal from a Ka-band space station can be deemed an ESAA if it otherwise complies with applicable Commission rules.²² However, links between the platforms and end user terminals clearly do not qualify for similar treatment – as the Elefante Group acknowledges, such links fall within the terrestrial fixed services, which have no allocation in conventional Ka-band spectrum²³ and therefore no protection rights vis-à-vis ESIM networks or other FSS operations. The ESIM rulemaking is not the appropriate venue for considering issues raised by these fixed service networks.

The concerns expressed by the Global Mobile Suppliers Association regarding possible adverse effects of ESIM use of the 28.35-28.6 GHz band on future terrestrial mobile use of the adjacent 27.5-28.35 GHz band²⁴ are also unfounded. The out-of-band emissions limits specified in Section 25.202(f) of the Commission’s rules apply to all FSS terminals, whether they are fixed or in motion, and no change to those limits is proposed in the Notice. The GSA has not presented any evidence to suggest that those limits are inadequate, and in any event, a re-evaluation of the Section 25.202(f) limits is clearly beyond the scope of the current proceeding.

Existing rules also address the interests of RAS and EESS users.²⁵ The regulatory framework in the Notice would retain the existing requirements highlighted by CORF for

²¹ Comments of Elefante Group, Inc., IB Docket No. 17-95, filed July 31, 2017, at 6-8.

²² *See id.* at 4-5.

²³ *See id.* at 5-6 & nn.9-10.

²⁴ Comments of Global Mobile Suppliers Association, IB Docket No. 17-95, filed July 31, 2017, at 2-4.

²⁵ *See* Comments of the National Academy of Sciences’ Committee on Radio Frequencies, IB Docket No. 17-95, filed July 31, 2017 (“CORF Comments”) at 4-10; Reply of the National Radio Astronomy Observatory, IB Docket No. 17-95, filed Aug. 14, 2017 (“NRAO Reply”) at 1.

coordination of ESIM networks in the 14.47-14.50 GHz frequencies with RAS observatories.²⁶ Similarly, footnote US74 to the Table of Frequency Allocations addresses the concerns discussed in the NRAO Reply regarding protection of RAS use of the 10.68-10.7 GHz band.²⁷ In any event, allowing ESIMs in the adjacent 10.7-10.95 GHz frequencies will not affect the interference environment for RAS, since ESIMs will only be receiving signals from GSO FSS satellites already allowed to operate in this downlink band segment.²⁸ Moreover, contrary to the concerns expressed by CORF, the introduction of ESIMs in the 18.6-18.8 GHz band will not have any adverse impact on the EESS.²⁹ This is also a satellite downlink band, so there will not be airborne ESIM terminals transmitting in this spectrum.

IV. THE COMMISSION MUST ENSURE IT HAS THE TOOLS NEEDED TO ADDRESS HARMFUL ADJACENT SATELLITE INTERFERENCE

SES and O3b strongly support Commission efforts to facilitate the deployment of ESIM terminals and ease regulatory burdens associated with ESIM licensing.³⁰ Granting greater flexibility and regulatory certainty to ESIM operators will encourage the delivery of a broad range of services to U.S. consumers, driving U.S. technology innovation in the ESIM space, enhancing competition, and reducing costs. As the expansion of ESIM offerings continues, however, the Commission must ensure that granting flexibility to ESIM operators does not deprive the Commission of its ability to identify and redress interference events if they arise.

²⁶ See Notice at ¶ 47 and proposed Section 25.228(j).

²⁷ 47 C.F.R. § 2.106, Footnote US74.

²⁸ See 47 C.F.R. § 25.202(a)(1). The provision in footnote 6 of this rule specifying that use of the band is limited to gateway operations applies only to NGSO FSS systems.

²⁹ CORF Comments at 6-10.

³⁰ SES/O3b Comments at 1.

Consistent with this concern, SES and O3b disagree with Telesat's suggestion that the Commission should decline to specify a time limit within which a network control and monitoring center must detect that aggregate off-axis e.i.r.p. density limits are being exceeded.³¹ Instead, the Commission should require that ESIM operators detect and address any exceedances of these limits within 100 milliseconds. This is the same time standard currently in force for ESIMs,³² and therefore systems have been designed to comply with this requirement.

Similarly, contrary to the approach endorsed by Boeing,³³ the Commission should continue to apply the specific time limits in Sections 25.226(a)(9) and 25.227(a)(9) for VMESs and ESAAs, respectively, to terminate transmissions upon a loss of synchronization with the target satellite. Boeing has not indicated that the 5 second limit for VMES terminals or the 100 millisecond limit for ESAAs has proven difficult for existing licensees to meet. SES is aware of situations where loss of synchronization of ESIMs has occurred and resulted in adjacent satellite interference. Requiring a rapid response to a loss of synchronization, rather than relying on the more open-ended language of Section 25.271(g), will reduce the risk and duration of harmful interference from VMES and ESAA terminals.

Although many parties question the need to retain data logging requirements because they have not been asked for the information collected under the current rules,³⁴ SES has had a different experience, as it has used such information in efforts to resolve incidents of adjacent satellite interference. Specifically, when it has identified the frequency and time frame

³¹ See Telesat Comments at 7.

³² See, e.g., 47 C.F.R. § 25.222(a)(2).

³³ Comments of The Boeing Company, IB Docket No. 17-95, filed July 31, 2017, at 6.

³⁴ See *id.* at 5; Comments of AC BidCo LLC, IB Docket No. 17-95, filed July 31, 2017, at 4; Comments of Hughes Network Systems, LLC, IB Docket No. 17-95, filed July 31, 2017, at 4.

of an unacceptable interference event, SES has then asked its customers about the identity and location of aircraft flying at that time and operating on the frequency in question. SES used this data to assess whether there was a correlation between a particular ESAA and the interference event. In order to ensure that information needed to eliminate adjacent satellite interference remains available as ESIM deployment increases, SES and O3b encourage the Commission to consider whether to simplify and streamline the data logging requirements rather than eliminate them altogether. For example, the Commission could reduce the required retention period from one year to 30 days to ease burdens on ESIM licensees. If the Commission does decide to remove the data logging requirements, it should at a minimum make clear to ESIM operators that they will be expected to cooperate fully with Commission staff and satellite operators in order to resolve any instances of harmful interference that appear to be caused by ESIM networks.

V. CONCLUSION

For the reasons discussed herein and in the SES/O3b Comments, the Commission should act expeditiously to facilitate ESIM operations with both GSO and NGSO systems in FSS spectrum.

Respectfully submitted,

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