

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)
)
Amendment of Parts 2 and 25 of the)
Commission's Rules to Allocate Spectrum and)
Adopt Service Rules and Procedures to Govern)
the Use of Vehicle-Mounted Earth Stations in)
Certain Frequency Bands Allocated to the Fixed-)
Satellite Service)

IB Docket No. 07-101

To: The Commission

**REPLY COMMENTS OF
THE BOEING COMPANY**

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SUMMARY

Boeing and a clear majority of the parties to this proceeding support a technologically-neutral approach for authorizing vehicle-mounted earth stations (“VMES”) in the Ku-band. Likewise, Boeing, joined by ViaSat, Inc. (“ViaSat”) and the Satellite Industry Association (“SIA”) support the notion of extending this same technologically-neutral approach to aeronautical platforms. Thus, aircraft-mounted earth stations (“AMES”) should also be designated as a primary application of the fixed-satellite service in the Ku-band. In fact, several arguments advanced by General Dynamics Corporation (“General Dynamics”) in favor of a primary allocation for VMES apply equally to a primary allocation for AMES.

Boeing further agrees with SIA that VMES and AMES applications should be given the option of complying with the Section 25.222(a)(6) and (7) off-axis e.i.r.p. density mask and pointing accuracy requirements that were adopted for earth stations onboard vessels (“ESVs”), or be permitted to demonstrate equivalent protection to adjacent satellites to that which would be provided by a conventionally steered antenna complying with Section 25.222(a)(6) and (7).

Boeing, however, opposes any proposal that such demonstration should be made pursuant to non-conforming status under Section 25.220 of the Commission’s rules. Such a requirement would require a VMES or AMES operator to obtain coordination letters from adjacent satellite operators and forego ALSAT status. The requirement is unduly burdensome and unnecessary since equivalent protection would be provided to adjacent satellites. Boeing also opposes a proposal by General Dynamics to limit the

scope of the Commission's VMES rules to potentially more expensive conventional VMES antennas.

In its comments, Boeing asserted that the Commission should require collection of operational data in ninety second intervals. Upon consultation with other parties to the proceeding, Boeing believes a collection interval of five minutes would be adequate to serve the Commission's goal of interference protection. Several parties claim that data logging requirements in general, or that collection in intervals of less than every twenty minutes, would be overly burdensome. Since the Commission has noted that some parties can collect such information in "real-time," collection intervals of five minutes are not overly burdensome.

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The Boeing Company ("Boeing"), by its attorneys and pursuant to Section 1.415 of the Commission's Rules, 47 C.F.R. § 1.415, hereby submits the following reply comments in response to the above-referenced Notice of Proposed Rulemaking ("NPRM")¹ regarding the adoption of service rules and procedures governing the operation of vehicle-mounted earth stations ("VMES") in Ku-band fixed-satellite service ("FSS") frequencies.²

Boeing observes that a clear majority of parties in this proceeding support a technologically-neutral approach for authorizing VMES in the Ku-band. Boeing endorses this approach, which provides licensees with maximum flexibility to employ

¹ Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service, IB Docket No. 07-101, *Notice of Proposed Rulemaking*, FCC 07-86, (released May 15, 2007) ("NPRM").

² Boeing is concurrently filing these reply comments for inclusion in the record for IB Docket No. 05-20.

whatever technologies they choose as long as they can demonstrate that they will provide equivalent protection to other satellite networks authorized to operate in Ku-band spectrum.

I. THE PARTIES AGREE THAT THE COMMISSION SHOULD NOT DISCRIMINATE BASED ON TECHNOLOGY, APPLICATION OR MOUNTING PLATFORM

In its comments, and in a separate letter filed in the aeronautical mobile satellite service (“AMSS”) docket,³ Boeing asserted that the Commission should refrain from designating VMES as a primary application of the FSS in the Ku-band without concurrently designating aircraft mounted earth stations (“AMES”) as a primary application of the FSS in the Ku-band.⁴ ViaSat, Inc. (“ViaSat”) supported this position, stating “[i]f the Commission affords VMES primary status, it should also treat AMSS as primary.”⁵ ViaSat rightly argued that consistent regulation of very similar services, such as VMES, earth stations on board vessels (“ESVs”) and AMES will permit economies of scale for manufacturers and service providers, thus reducing costs to end users.⁶ These economies of scale will facilitate efficient use of the Ku-band.⁷ In addition, the Satellite Industry Association (“SIA”) supported this position, stating the consensus position of

³ The Boeing Company, Written Ex Parte, IB Docket No. 05-20 (filed August 17, 2007).

⁴ See Comments of The Boeing Company, IB Docket No. 07-101, at 4-16 (filed August 17, 2007 (“Boeing VMES Comments”).

⁵ See Comments of ViaSat, Inc., IB Docket No. 07-101, at note 7 (filed August 17, 2007) (“ViaSat Comments”).

⁶ See *id.* at 5.

⁷ See *id.*

the satellite industry that the Commission should explore application of the ESV and VMES approach to aeronautical services.⁸

The importance of providing primary status for AMES is emphasized by the comments of General Dynamics Corporation (“General Dynamics”). Arguing in reference to VMES, General Dynamics explains in its comments that primary status is necessary because, without primary status, VMES could not be blanket licensed and would not receive protection from interference caused by terrestrial users in the band.⁹ General Dynamics further argues that primary status for VMES will facilitate compatibility among ESVs, VMES, VSATs and other FSS primary allocations, including interference protection to all.¹⁰ Each of these arguments apply equally to aeronautical applications that are already being provided in Ku-band FSS frequencies.¹¹

To effectuate VMES and AMES technologies and mounting platform neutrality, Boeing requested in its comments that the Commission include AMES in the proposed footnotes NGxxx and NGyyy, as well as add a definition of AMES to the Commission’s proposed rules.¹² Although Boeing continues to support this approach, a more

⁸ See Comments of the Satellite Industry Association, IB Docket No. 07-101, at note 5 (filed August 17, 2007) (“SIA Comments”).

⁹ See Comments of General Dynamics Corporation, IB Docket No. 07-101, at 16 (filed August 17, 2007) (“General Dynamics Comments”).

¹⁰ See *id.* at 21.

¹¹ In fact Boeing argued in its comments that primary VMES services could raise interference concerns for secondary AMSS services, and therefore VMES should not be granted a primary allocation without concurrently providing a primary allocation to AMES. See Boeing VMES Comments at 8-10. In this context, Boeing also asserted concerns about intersystem coordination, which would be more readily accomplished if each service is afforded primary status. See Boeing VMES Comments at 10.

¹² See *id.* at 16-17.

administratively efficient method to treat VMES and AMES equally may be to modify the definition of VMES in the Commission's proposed rules so that the definition no longer confines itself to vehicles that "travel primarily on land."¹³ Permitting AMES to fit within the definition of VMES will allow equal treatment of ground and aeronautical vehicle mobile earth stations, as requested by Boeing and supported by ViaSat and SIA.

II. VMES AND AMES APPLICATIONS SHOULD BE PERMITTED TO DEMONSTRATE EQUIVALENT PROTECTION TO THE SECTION 25.222 OFF-AXIS EIRP DENSITY LIMITS AND POINTING ACCURACY REQUIREMENTS

Boeing asserted in its comments that, assuming a VMES or AMES application meets the off-axis e.i.r.p. density limits contained in Section 25.222 of the Commission's rules, the pointing accuracy requirements contained in the rules are unnecessary and unduly burdensome.¹⁴ Boeing sought Commission rules for VMES and AMES that would permit flexibility in the technologies that an operator uses to protect adjacent satellites from interference.

Upon consultation with other parties in this proceeding, Boeing can generally support the protection methods proposed by SIA.¹⁵ Boeing supports application of the requirements of Section 25.222(a)(6) and (7) to VMES and AMES, which include the ESV off-axis e.i.r.p. density mask and pointing accuracy requirements. Boeing, however,

¹³ Section 25.201 would read as follows:

Vehicle-Mounted Earth Station. A VMES is an earth station, operating from a motorized vehicle that receives from and transmits to fixed-satellite space stations and operates pursuant to the requirements set out in § 25.XXX of this part.

¹⁴ See Boeing VMES Comments at 23-25.

¹⁵ See SIA Comments, at 13-16.

also supports permitting operators to submit license applications to the Commission that demonstrate that the use of signal spreading, system-based power spectral density (“PSD”) controls, or other techniques would provide equivalent protection to adjacent satellites to that which would be provided by a conventionally steered antenna complying with Section 25.222(a)(6) and (7). Such equivalent protection could be provided by using various combinations of pointing accuracy (or no pointing accuracy) and power levels.

License applicants that make such demonstrations should be authorized to operate VMES and AMES networks in the Ku-band on the same terms and conditions as network operators using conventionally steered antennas. This approach for VMES and AMES would combine the familiar, tested, and successful technical requirements applicable to ESVs with the technological flexibility urged by Boeing in its comments and recognized by the Commission in the context Boeing’s AMSS authorization.¹⁶ Boeing further agrees with SIA that a one dB reduction in power should not be required.¹⁷ Instead, an operator should have the flexibility to demonstrate to the Commission in its license application that a spread spectrum modulation technique with reduced power (or other method) can provide equivalent protection.

There is general industry support for the Boeing and SIA position on these issues. ViaSat agrees that there is no need for pointing accuracy requirements if an operator includes pointing error in its calculations for meeting the applicable mask.¹⁸ ViaSat

¹⁶ See Boeing VMES Comments, at 24-25.

¹⁷ See SIA Comments at 15.

¹⁸ See ViaSat Comments at 8.

agreed that “[s]trict antenna pointing requirements are unnecessary with respect to spread spectrum systems operating at high chip rates, with wide signal spread, because the power density transmitted by antennas in such systems is so low that, even when antennas are mispointed, interference will not occur as a result.”¹⁹ SES Americom agreed, stating “[t]he Commission should license VMES systems that do not meet the strict pointing accuracy requirements if the applicant demonstrates that its operations will not cause harmful interference....”²⁰ Finally, this position was supported by the National Spectrum Managers Association, which argued “...that the 0.2 degree pointing accuracy requirement may not be necessary for VMES terminals that adequately take mispointing into account and operate at lower power levels.”²¹

Raysat Antenna Systems, LLC (“Raysat”) agreed that pointing accuracy requirements are unnecessary for terminals that take mispointing into account and operate at lower power levels.²² Raysat argues that such terminals should be given primary status if they can demonstrate compliance with the worst-case off-axis e.i.r.p. density limits of routinely licensed VSAT terminals.²³ Raysat, however, appears to suggest that terminals that comply with such limits, but do not satisfy any additional requirements, such as pointing accuracy restrictions could “...be treated as non-conforming terminals under the

¹⁹ *Id.*

²⁰ Comments of SES Americom, Inc. and Americom Government Services, IB Docket No. 07-101, at 4 (filed August 20, 2007).

²¹ Comments of The National Spectrum Managers Association, IB Docket No. 07-101, at 6 (filed August 17, 2007).

²² *See* Comments of Raysat Antenna Systems, LLC, IB Docket No. 07-101, at 11 (filed August 17, 2007) (“Raysat Comments”).

²³ *See id.*, at 9.

procedures established for non-conforming transmit/receive earth station operations in section 25.220 of the Commission's Rules.”²⁴

Section 25.220 generally requires VSAT operators to obtain coordination letters from adjacent satellite operators prior to securing authorization to operate non-conforming networks in the Ku-band. Such requirements are unduly burdensome and entirely unnecessary in this case because VMES and AMES networks using alternative combinations of power and pointing accuracy will provide equivalent protection to adjacent satellite networks, and will not receive additional interference protection from adjacent networks.

Furthermore, a Section 25.220 approach would result in the withholding of ALSAT status from VMES and AMES networks that use alternative combinations of power and pointing accuracy. The loss of ALSAT status would place such VMES and AMES network operators at a significant competitive disadvantage as compared to operators of VMES and AMES networks using antenna technologies that explicitly comply with the 0.2° pointing accuracy requirement.

General Dynamics argues for only the Section 25.222 off-axis e.i.r.p. density and pointing accuracy requirements, and draws a distinction between two methods for VMES antennas to achieve interference avoidance. The method General Dynamics prefers, its own, is a more expensive antenna with 0.2° pointing control that allows higher gain towards the target satellite.²⁵ The second method is a more cost-effective antenna utilizing spread spectrum technology and reduced power to meet the off-axis e.i.r.p.

²⁴ *Id.*, at 7.

²⁵ *See* General Dynamics Comments at 10.

density limits, even with antenna mispointing.²⁶ General Dynamics concedes that both methods can achieve the Commission’s interference avoidance goals, but asserts its method is superior because of its higher gain to the target satellite, which, it says, results in “better efficiency in the use of satellite transponder capacity.”²⁷

The two methods described merely represent different technological approaches to achieve interference avoidance that also achieve spectrum efficiency differently. The terminals utilizing spread spectrum technologies, as discussed by SIA, Boeing, ViaSat and SES Americom, are more cost-effective terminals for their specific applications, thereby permitting more users of VMES and AMES services and greater use of the allocated Ku-band spectrum. In other words, General Dynamics prefers more expensive antennas that require less transponder capacity and others may prefer more cost-efficient antennas that may require the operator to purchase more transponder capacity. Both methods provide equal interference avoidance, which is the concern of the Commission expressed in the *NPRM*.²⁸ The decision between the two methods should be a business decision made by the operator, rather than a regulatory decision made by the Commission.

III. THE COMMISSION SHOULD REQUIRE COLLECTION OF DATA IN NO LONGER THAN FIVE MINUTE INTERVALS

In its comments, Boeing proposed collection of a VMES’ location, transmit frequency, channel bandwidth, and satellite used in ninety second intervals.²⁹ Although

²⁶ *Id.* at 9-10.

²⁷ *Id.* at 10.

²⁸ *See NPRM*, ¶ 55.

²⁹ *See* Boeing VMES Comments at 29.

Boeing continues to believe that collection of such data is important, after consultation with other parties in this proceeding, Boeing believes collection of such data in five minute intervals would achieve the interference protection goals of the Commission and not overly-burden VMES operators.

Several parties oppose the proposed data logging requirements. Raysat argued in its comments that the twenty minute interval for data collection contained in the ESV rules is not meaningful.³⁰ Boeing agrees and addressed the potential drawbacks of a twenty minute data logging interval in its comments.³¹ Raysat, however, further argues that requiring data collection in more frequent intervals would cause data retention or processing burdens for operators.³² The Commission proposed requiring “real-time” data collection for AMSS operations in the AMSS proceeding and noted that some ESV operators were able to collect such data in “real-time” in the ESV order.³³ Therefore, VMES operators should not consider collection intervals of five minutes overly burdensome.

Maritime Telecommunications Network, Inc. (“MTN”) opposes data logging requirements for VMES, and requests elimination of this requirement for ESVs.³⁴

³⁰ See Raysat Comments at 14.

³¹ See Boeing VMES Comments at 29.

³² See Raysat Comments at 14.

³³ See Boeing VMES Comments at 29 and Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz Bands, IB Docket No. 02-10, *Report and Order*, 20 FCC Rcd 674, 721, ¶ 112 (2005) (“*ESV Order*”).

³⁴ See Comments of Maritime Telecommunications Network, Inc., IB Docket No. 07-101, at 7 (filed August 17, 2007).

MTN's position is based on its assertion that the Commission's primary concern in imposing these requirements for ESVs was protection of C-band terrestrial wireless services.³⁵ The Commission's *ESV Order*, however, clearly expressed concern about Ku-band interference resulting from ESV networks. These identical concerns were expressed in the AMSS proceeding³⁶ and in this proceeding, which can be remedied in part with a data logging requirement as described by Boeing herein.³⁷

Finally, the Association of Public Television Stations and the Public Broadcasting Service ("PBS") argue in their comments that data should be made available upon request within one hour.³⁸ The PBS comments do not say to what entity the information must be provided, however, a fair reading of the context indicates that PBS' proposal is that the data collected should be made available to other operators. Boeing opposed a requirement that such information be available to any party other than the applicable

³⁵ *Id.*

³⁶ *See Service Procedures and Rules to Govern the Use of Aeronautical Mobile Satellite Service Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service*, IB Docket No. 05-20, *Notice of Proposed Rulemaking*, 20 FCC Rcd 2906, 2934, ¶54 (2005) (stating "A necessary part to identifying sources of interference has always been the knowledge of exactly where the transmitting and receiving stations are....").

³⁷ On a related matter, Boeing herein clarifies its proposal that the Commission should require "professional installation" of VMES terminals. As discussed in Boeing's comments, there are RF hazard concerns raised by VMES that are not applicable to ESV and AMES terminals. The combination of low elevation angles and the fact that VMES will likely be used on public highways and in urban areas raises important concerns regarding pointing of the beam. Therefore, Boeing proposed in its comments that the Commission require "professional installation" of VMES and AMES antennas. By the terms "professional installation" Boeing means only that VMES terminals should be installed by technically qualified personnel.

³⁸ *See Joint Comments of The Association of Public Television Stations and The Public Broadcasting Service*, IB Docket No. 07-101, at 4 (filed August 17, 2007).

regulatory bodies in the ESV proceeding and in its comments in this proceeding.³⁹ In its comments, SIA supported providing such information only to the Commission or the National Telecommunications and Information Association.⁴⁰ In addition, SIA stated in its comments that requiring all data to be provided within twenty-four hours may be unrealistic.⁴¹ Certainly, a one hour requirement is not feasible.

IV. CONCLUSION

Boeing, and a clear majority of parties to this proceeding, urge the Commission to utilize a technologically-neutral approach to authorizing VMES in the Ku-band. In doing so, the Commission should not designate VMES as a primary application of the FSS in the Ku-band without providing the same designation for AMES. Boeing and SIA agree that the Commission should allow a VMES or AMES operator that does not meet the Section 25.222(a)(6) and (7) off-axis e.i.r.p. density mask and pointing accuracy requirements to demonstrate equivalent protection to adjacent satellites in its license

³⁹ See Boeing VMES Comments at 28-29.

⁴⁰ See SIA Comments at 19.

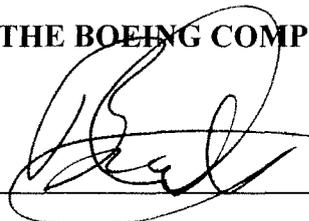
⁴¹ *Id.*

application. The use of such technologically-neutral regulations and procedures will encourage the most productive use of FSS Ku-band spectrum assets.

Respectfully submitted,

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