

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

In the Matter of)
) IB Docket No. 02-10
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/11.7-12.2 GHz Bands.)

To: The Commission

**CONSOLIDATED OPPOSITION TO PETITIONS FOR RECONSIDERATION
OR CLARIFICATION AND COMMENTS OF THE BOEING COMPANY**

The Boeing Company (“Boeing”), by its attorneys and pursuant to Sections 1.4(b)(1) and 1.429 of the Commission’s Rules,¹ hereby submits its Consolidated Opposition to Petitions for Reconsideration or Clarification and Comments in the above-captioned proceeding regarding the use of earth stations on board vessels (“ESVs”).² In this submission, Boeing addresses the Petition of PanAmSat Corporation for Reconsideration or Clarification and the Petition for Reconsideration of ARINC Incorporated.³ While other parties filed Petitions in this proceeding directed at issues associated with the use of ESVs in the C-band, Boeing’s Consolidated Opposition and Comments are directed to the issues specific to the Ku-band where Boeing

¹ 47 C.F.R. §§ 1.4(b)(1) & 1.429.

² See 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/11.7-12.2 GHz Bands, *Report and Order*, IB Docket No. 02-10, FCC 04-286 (rel. Jan. 6, 2005) (“*ESV Order*”).

³ See Petition of PanAmSat Corporation for Reconsideration or Clarification (filed March 2, 2005) (“PanAmSat Petition”); ARINC Incorporated Petition for Reconsideration (filed March 2, 2005) (“ARINC Petition”).

proposes to provide maritime communications services. However, certain issues raised herein may be applicable to C-band ESV operations as well.

As the Commission is aware, Boeing submitted a Petition for Partial Clarification or Reconsideration in this proceeding.⁴ Boeing generally is very supportive of the Commission's *ESV Order*. However, Boeing believes that further clarification and/or reconsideration is required as to a few matters in order to ensure that the regulatory regime established by the Commission more fully advances the goals for market-driven deployment of satellite-based broadband technologies in the maritime sector.⁵ Specifically, Boeing has requested clarification or reconsideration of the following issues:

- (i) off-axis e.i.r.p. levels of ESV transmissions that are overly restricted to the routine licensing values established in the *ESV Order*, which reflect Commission's two-degree spacing limits, regardless of the coordinated parameters of the serving satellite;
- (ii) the methodology for calculating the aggregate off-axis e.i.r.p. of simultaneously transmitting ESVs;
- (iii) the response time associated with ESV tracking accuracy exceedance; and
- (iv) the establishment of a 300 km demarcation line for prior agreement for foreign-licensed Ku-band ESV operations throughout the entire 14.0-14.5 GHz band, even though the minimum distance in the applicable ITU Resolution for Ku-band ESV operations is only 125 km and the United States is only listed as a "potentially concerned administration" with respect to the 14.4-14.5 GHz band.

The ARINC Petition, however, requests that the Commission eliminate entirely the 0.2 degree pointing error limit adopted in the *ESV Order* in light of the specification of an aggregate

⁴ See Petition for Partial Clarification or Reconsideration of The Boeing Company (filed March 2, 2005) ("Boeing Petition").

⁵ See *ESV Order* at ¶ 4.

off-axis e.i.r.p. mask to protect adjacent satellites.⁶ Boeing is sympathetic to ARINC's argument regarding the need for flexibility regarding pointing accuracy and the ability of systems to protect adjacent satellites by complying with an aggregate off-axis e.i.r.p. mask, and Boeing has already noted the availability of alternative pointing accuracy requirements that would provide sufficient flexibility for ESV operators while ensuring adequate protection for adjacent Fixed-Satellite Service ("FSS") operations. However, Boeing believes that the pointing requirement in Resolution 902 (Geneva, 2003), which provides technical and operational requirements governing ESV operations, must still be recognized.

The PanAmSat Petition requests changes in the *ESV Order* that would result in a giant step backwards with respect to the provision of ESV services and should be rejected as inconsistent with the goals established by the Commission in this proceeding. PanAmSat's suggestions that ESVs must cease transmissions when mispointed 0.2 degrees or more, and should be authorized on the basis of antenna gain and input power rather than off-axis e.i.r.p. spectral density levels, ignore the Commission's recent initiatives to streamline the earth station licensing process and the operational realities of ESV and other FSS services. While protection of existing services and users of the spectrum is an important consideration whenever a new service is being authorized, if PanAmSat's views were accepted, ESV operations by U.S. licensees in the Ku-band would be subjected to onerous and unnecessary operational restrictions which would make it even harder for them to compete on a global basis.

⁶ See ARINC Petition, at 3-6. However, Boeing agrees with ARINC that the Commission should not import such a pointing accuracy requirement into rules governing the Aeronautical Mobile-Satellite Service ("AMSS"). *Id.* at n. 1.

I. THE COMMISSION SHOULD MODIFY ITS ANTENNA POINTING ACCURACY REQUIREMENTS FOR ESV OPERATIONS

ARINC suggests that the Commission's 0.2 degree ESV antenna mispointing rule is not needed for ESV operations in order to protect adequately satellites adjacent to the target satellite in the geostationary arc.⁷ ARINC argues that so long as an ESV operator is in compliance with the new aggregate off-axis e.i.r.p. spectral density mask, adjacent satellites will be fully protected regardless of the pointing accuracy of an individual terminal. While Boeing agrees in principle that an off-axis e.i.r.p. mask protects adjacent satellite operations by requiring ESV transmit power reduction in proportion to antenna mispointing beyond specified standards, Boeing recognizes that Resolution 902 contains a 0.2 degree pointing accuracy provision that has been accepted internationally as the appropriate standard for ESVs. As a result, wholesale elimination of the ESV pointing accuracy requirement may not be appropriate.

PanAmSat, on the other hand, urges the Commission to severely tighten the pointing accuracy rule by requiring a detailed technical demonstration by an ESV operator that its earth stations can achieve and maintain a 0.2 degree pointing accuracy,⁸ and immediate cessation of ESV transmissions in the event of mispointing greater than 0.2 degrees (rather than the 0.5 degree shutdown requirement adopted by the Commission).⁹ Neither requirement is necessary. As previously indicated, so long as the aggregate off-axis e.i.r.p.-density remains below the proscribed levels, there should be no risk of harmful interference to adjacent satellites. Thus,

⁷ See 47 C.F.R. §§ 25.222(a)(6) & (a)(7).

⁸ See PanAmSat Petition at 2-3. The rules already require that all applications for ESV licenses provide "sufficient data" to demonstrate that the proposed ESV operations meet the technical criteria for licensing, including pointing accuracy. See 47 C.F.R. § 25.222(a)(6). To the extent this rule remains in effect, Boeing sees no reason to adopt the additional language proposed by PanAmSat regarding a further "technical showing."

⁹ See PanAmSat Petition at 2-3.

PanAmSat's request to inappropriately tighten the ESV pointing accuracy requirements should be rejected.

In its Petition, Boeing suggested that further refinement of the Commission's tracking requirement similar to that adopted by the European Telecommunications Standards Institute ("ETSI") working group on ESVs may be appropriate in the context of the timing requirement associated with the Commission's tracking error rule.¹⁰ Boeing also noted that in Section 4.2.3.2 of Draft ETSI EN 302 420, a tracking error threshold ($\delta\phi$) is incorporated into the off-axis e.i.r.p. requirement such that the off-axis mask is lowered in proportion to $\delta\phi$.¹¹ While Boeing generally agrees that ESV transmit power reduction can be linked to an ESV tracking accuracy requirement, the relationship between the 0.2 degree tracking requirement and an ETSI type approach should be clarified.

Boeing believes that the 0.2 degree tracking requirement should be treated as a *de-minimis* tracking error below which the off-axis e.i.r.p. effect of mispointing can be ignored. This formalizes the current practice within the FSS industry, which generally ignores the off-axis e.i.r.p effect of installation pointing errors for small FSS terminals such as VSATs. Consider a typical 1.2 m Ku-band VSAT: at 11.95 GHz, the center of the U.S. Ku-band receive band, the VSAT will have a beam width of 1.46 degrees. If pointing of this VSAT is established using the receive signal of its target satellite with an accuracy of 0.25 dB, then it will have a pointing error 0.21 degrees. This condition applies to hundreds of thousands of installed VSATs in the United States. The small increase in off-axis e.i.r.p. from this pointing error is never formally treated.

¹⁰ See *Boeing Petition* at 20-21.

¹¹ See *id.* at 21.

Thus, Boeing proposes that if ESVs achieve a tracking accuracy of 0.2 degrees or better, then the off-axis e.i.r.p. increase should not be considered. However, if an ESV cannot meet this requirement, then it should reduce its e.i.r.p. in the manner prescribed in Section 4.2.3.2 of Draft ETSI EN 302 420 such that the off-axis e.i.r.p. power density requirement is met despite the larger tracking error. In other words, ESVs with a declared tracking error threshold of 0.2 degrees or less would be permitted to transmit at full power, but ESVs with a greater tracking error threshold (*e.g.*, 0.3 degrees) would be required to reduce maximum permissible transmit power in proportion to the tracking error threshold (even for on-axis transmissions). This would be consistent with the 0.2 degree pointing accuracy requirement of Resolution 902 because it reduces the maximum permissible transmit power for ESVs that do not satisfy this objective, and is also consistent with the Commission's regulation of other FSS earth stations such as VSATs, where small antenna mispointing is generally ignored for purposes of establishing maximum transmit power levels.

II. THE COMMISSION SHOULD NOT ALTER ITS APPROACH FOR THE BLANKET LICENSING OF ESVs

PanAmSat asks the Commission to reconsider its reasoned decision to allow ESV operators to utilize antennas that do not otherwise comply with the Rules so long as the aggregate off-axis e.i.r.p.-density levels are met for cross-polarized and co-polarized operations.¹² In this regard, the Commission adopted Boeing's suggested approach for the routine licensing of ESV operations on the basis of off-axis e.i.r.p. density levels.¹³

PanAmSat has presented insufficient reasons for changing these rules. The only rationale provided in its Petition is the fact that the ESV rules are more flexible than the current rules

¹² See PanAmSat Petition at 4-5.

¹³ See *ESV Order* at ¶ 98-101.

applicable for the routine licensing of non-ESV earth station operations. PanAmSat concedes, as it must, that the non-ESV rules have been under review by the Commission in IB Docket No. 00-248. Indeed, subsequent to the filing of the PanAmSat Petition, the Commission released its *Fifth Report and Order* and *Sixth Report and Third Further Notice* in that proceeding, rejecting many of proposals presented by PanAmSat as well as adopting and proposing new rules that are more closely aligned with the ESV rules adopted in this proceeding.¹⁴ In fact, the Commission has proposed in its streamlining proceeding an off-axis e.i.r.p. envelope approach for all FSS earth stations in the conventional C- and Ku-bands very similar to the regulatory approach adopted in this proceeding for the blanket licensing of ESVs as well as Ka-band FSS earth stations.¹⁵

Instead of applying the outdated rules for the processing of Ku-band VSAT earth station applications to a new service like ESV operations, the Commission appropriately has chosen to adopt a more flexible licensing approach for ESV operators that adequately protects other services from harmful interference while allowing greater innovation for new services. As the Commission explained in the *Fifth Report and Order*, it expects that its new rules for satellite earth stations “will expedite the provision of satellite services to the public, without increasing the risk of harmful or unacceptable interference to existing operators in any significant way.”¹⁶

¹⁴ See 2000 Biennial Regulatory Review -- Streamlining and Other Revisions of Part 25 of the Commission’s Rules Governing Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations, *Fifth Report and Order*, FCC 05-63 (released March 15, 2005) (“*Fifth Report and Order*”); 2000 Biennial Regulatory Review -- Streamlining and Other Revisions of Part 25 of the Commission’s Rules Governing Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations, *Sixth Report and Order and Third Further Notice of Proposed Rulemaking*, FCC 05-62 (released March 15, 2005) (“*Sixth Report and Third Further Notice*”).

¹⁵ *Sixth Report and Third Further Notice*, at ¶¶ 74-76.

¹⁶ *Fifth Report and Order*, at ¶ 11.

And in its *Sixth Report and Third Further Notice*, the Commission noted that its proposed revisions to Part 25 “should give earth station operators in the fixed-satellite service more flexibility in implementing state-of-the-art earth stations.”¹⁷ The same rationale applies to the routine licensing of ESV operations.

Indeed, as reflected in the Boeing Petition, there is a need for the Commission to reconsider its *ESV Order* to provide even further flexibility for licensing Ku-band ESV systems in order to allow such earth stations to operate at power levels in excess of the blanket licensing values: (i) for operations with satellites in regions where two-degree satellite spacing is not the norm and operator-to-operator coordination is relied on to establish adjacent satellite interference limits; and (ii) where ESV transmissions in excess of the off-axis e.i.r.p. values can be coordinated with adjacent satellite operators in a two-degree spacing environment.¹⁸

Again, such additional operational and licensing flexibility would be consistent with the Commission’s recent decisions and proposals in IB Docket No. 00-248. For example, in the *Fifth Report and Order* the Commission established more streamlined procedures for applicants proposing non routine earth stations and power levels as well as “non-conforming” operations with adjacent satellite operators, including certification and post filing coordination procedures.¹⁹ Similarly, in its *Sixth Report and Third Further Notice* the Commission has proposed applying these same streamlined rules to its new off-axis e.i.r.p. envelope approach for licensing earth stations in the conventional C- and Ku-bands.²⁰ As discussed in the Boeing Petition, the public

¹⁷ *Sixth Report and Third Further Notice*, at ¶1.

¹⁸ See Boeing Petition at 3-16.

¹⁹ See *Fifth Report and Order*, at ¶¶ 70-79.

²⁰ See *Sixth Report and Third Further Notice*, at ¶¶ 93-96.

interest would be better served by not overly restricting U.S.-licensed Ku-band ESV transmit power levels where the serving satellite has coordinated off-axis e.i.r.p. levels in excess of the ESV routine licensing values.

III. CONCLUSION

For all of the foregoing reasons, Boeing respectfully requests that the Commission clarify and/or reconsider its *ESV Order* as suggested in the Boeing Petition and this submission.

Respectfully submitted,

A handwritten signature in cursive script that reads "Philip L. Malet" followed by a date "1/20/05".

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CERTIFICATE OF SERVICE

I, Lee C. Milstein, hereby declare that copies of the foregoing electronically-filed Consolidated Opposition to Petitions for Reconsideration or Clarification and Comments of The Boeing Company were sent on this 21st day of April, 2005 by United States Postal Service to the following:

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