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

In the Matter of	)	
	)	
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	)	IB Docket No. 02-10

ORDER ON RECONSIDERATION

Adopted: July 30, 2009 **Released: July 31, 2009**

By the Commission:

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I. INTRODUCTION

1. In this Order on Reconsideration, we consider four petitions seeking reconsideration and/or clarification of the Commission's 2005 Report and Order (*ESV Order*)[1] in which it adopted licensing and service rules for earth stations on vessels (ESVs) operating in the 5925-6425 MHz/3700-4200 MHz band (C-band)[2] and the 14.0-14.5 GHz/11.7-12.2 GHz band (Ku-band).[3] ESVs are mobile transmitters that facilitate communications services, including broadband services and internet access, to cruise ships, merchant ships, ferries, yachts, U.S. navy vessels, and certain other maritime vessels that carry a stabilized satellite dish. In acting upon these petitions – filed by ARINC Incorporated (ARINC), the Boeing Company (Boeing), the Fixed Wireless Communications Coalition (FWCC) and Maritime Telecommunications Network (MTN)[4] – we resolve various concerns raised regarding the operational restrictions placed on ESVs that are designed to protect the fixed-satellite service (FSS), operating in the C-band and Ku-band, and the terrestrially-based fixed service (FS), operating in the C-band, from harmful interference.[5] The revisions we adopt today will provide ESV operators with greater operational flexibility while continuing to ensure that the other services in these bands are protected from harmful interference.

II. BACKGROUND

2. In 2005, the Commission released the *ESV Order*, which established licensing and service rules for ESVs to operate in the C-band and Ku-band frequencies. Previously, the Commission had authorized ESVs to operate in those bands pursuant to Special Temporary Authority (STA).[6] Because other radio services, including both FSS and FS stations, operate in the C-band and Ku-band, the Commission adopted in the *ESV Order* technical conditions for ESV operations in order in these bands to

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[1] *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*, IB Docket No. 02-10, Report and Order, FCC 04-286, 20 FCC Rcd 674 (2005) (*ESV Order*).

[2] The C-band uplink and downlink are allocated to the terrestrial fixed service (FS) and the fixed-satellite service (FSS) on a co-primary basis. The 5925-6425 MHz band also is known as the C-band uplink or 6 GHz band; the 3700-4200 MHz band also is known as the C-band downlink or 4 GHz band. The 5925-6425 MHz band is densely used by the fixed point-to-point microwave service.

[3] The Ku-band uplink and downlink are allocated to the FSS on a primary basis. *See infra* footnotes 7 & 12 regarding non-FSS users in the band. The 14.0-14.5 GHz band also is known as the Ku-band uplink or 14 GHz band; the 11.7-12.2 GHz band also is known as the Ku-band downlink or 12 GHz band. ESVs may also operate in a portion of the extended Ku-band (10.95-11.2 GHz and 11.45-11.7 GHz).

[4] Appendix A contains the complete list of filings. Boeing subsequently withdrew its petition, in part. *See* Letter from Carlos M. Nalda, Counsel for Boeing, to Marlene H. Dortch, Secretary, FCC (dated Mar. 23, 2007). A petition filed by PanAmSat was also withdrawn. *See* Letter from Susan H. Crandall, Counsel for Intelsat Corporation, to Marlene H. Dortch, Secretary, FCC (dated Feb. 14, 2007) (Intelsat Feb. 14 *Ex Parte* Letter).

[5] We note that the *VMES Report and Order* is being adopted at the same time as this Order on Reconsideration. The *VMES Report and Order* adopts rules for Ku-band earth stations mounted on vehicles. The VMES rules largely are modeled after the ESV rules, including the rule changes adopted in this Order on Reconsideration. *See 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, Report and Order, FCC 09-64 (rel. July 31, 2009).

[6] *See ESV Order*, 20 FCC Rcd at 677-678, ¶¶ 5-6.

prevent harmful interference to these other services.[7] Specifically, to protect the FSS in the C- and Ku-bands, the Commission adopted technical requirements for ESV operators, including off-axis effective isotropically radiated power (e.i.r.p.) spectral-density limits[8] and an antenna pointing error requirement.[9] To protect the FS in the C-band, the Commission required ESV operators to coordinate with affected FS operations; placed limits on the amount of spectrum that ESV operators are permitted to coordinate; limited the e.i.r.p. towards the radio horizon and the e.i.r.p. spectral-density towards the radio horizon; and limited the installation of ESVs to vessels weighing 300 gross tons or more.[10] In addition, the Commission encouraged ESV operators to use the Ku-band rather than the C-band by imposing fewer operational restrictions on ESV operators using the Ku-band.[11] The Commission adopted this action because the Ku-band has a much smaller presence of the FS than the C-band and, therefore, there is less potential for interference to the FS in the Ku-band.[12] The Commission also established rules for licensing ESV systems, including licensing of ESV hub stations and/or blanket licensing for ESV earth stations.[13] Finally, to protect U.S. satellite and terrestrial licensees from harmful interference, the Commission created a regulatory framework for foreign-licensed ESVs operating near the United States.[14]

III. DISCUSSION

3. In this Order on Reconsideration, we first address petitioners' and commenters' requests for various revisions to operational and technical rules adopted to protect co-frequency FSS, including: (1) Boeing's proposal to operate at higher off-axis e.i.r.p. spectral-density levels; (2) ARINC's proposal to eliminate the 0.2 degree antenna pointing error requirement; and (3) Intelsat's proposal to increase the starting angle of the off-axis e.i.r.p. spectral-density envelope to 1.5 degrees. The changes we adopt should promote operational flexibility for ESVs while continuing to ensure that the FSS will be protected from harmful interference.

4. Second, we discuss proposals to revise technical and operational measures adopted to protect co-frequency FS in the C-band, including MTN's proposals to: (1) modify and clarify our requirement for ESVs to protect offshore FS stations; and (2) modify and clarify our requirement for ESVs to cease transmissions when an objection to continuation of the ESV operation is received in response to the Public Notice announcing the ESV coordination. We also address the FWCC's proposals to modify the spectrum limit requirement for ESVs. Further, we decline to address the FWCC's request

[7] The other services located in the Ku-band include radio astronomy service and space research service. *See ESV Order*, 20 FCC Rcd at 712-713, 715, ¶¶ 89-90, 96.

[8] The phrase "off-axis e.i.r.p. spectral-density" is used synonymously with "off-axis power-density."

[9] *See ESV Order*, 20 FCC Rcd at 698-699, 716-717, 718-719, ¶¶ 55-58, 98-101, 103-106.

[10] *See ESV Order*, 20 FCC Rcd at 691-695, 700, ¶¶ 39-45, 61-62.

[11] *See ESV Order*, 20 FCC Rcd at 705, ¶ 75. The Commission continues to allow ESVs to utilize the C-band because that band offers greater reliability and accessibility than the Ku-band. *ESV Order*, 20 FCC Rcd at 683-684, ¶ 16.

[12] The FS Ku-band systems include grandfathered local television transmission service (LTTS) (there were 25 multi-frequency licenses in 2005 that included Ku-band channels) and several secondary Federal Government mobile, fixed and transportable telemetry operations in the 14.4-14.5 GHz band. *See ESV Order*, 20 FCC Rcd at 709-715, ¶¶ 83-95.

[13] *ESV Order*, 20 FCC Rcd at 722-723, ¶¶ 114-117.

[14] *See ESV Order*, 20 FCC Rcd at 724-725, ¶¶ 122-128.

that we revisit the Commission's earlier decision and modify our rules regarding ESV use of the C-band on inland waterways, the minimum vessel size for ESVs, and ESV spectrum coordination.

5. Third, we address Boeing's request to reduce the distance from the U.S. coastline that triggers operational conditions for foreign-licensed Ku-band ESVs using foreign hubs. Finally, we make various procedural changes to Sections 25.221 and 25.222. For example, we re-designate the rules by separating the ESV operational requirements from the ESV application requirements, which are intermingled in the current version of the rules.[15] These procedural changes help to clarify the rules and facilitate the application process.

A. Measures Protecting FSS Operations

6. We first consider the following requests seeking reconsideration of the Commission's ESV technical requirements designed to protect the FSS in the C- and Ku-bands: (1) Boeing's proposals to: (a) allow ESV operators to operate at higher off-axis e.i.r.p. spectral-density levels; and (b) allow ESV applicants to demonstrate compliance with coordination agreements between the target satellite and adjacent satellite operators by filing a certification from the target satellite operator certifying that the higher off-axis e.i.r.p. spectral-density levels have been accepted by the adjacent satellites; (2) ARINC's proposal to eliminate the antenna pointing error requirement; and (3) Intelsat's proposal to increase the starting angle of the off-axis e.i.r.p. spectral-density envelope to 1.5 degrees. We note that, although the FSS issues raised by petitioners primarily concern the Ku-band, we apply the rule changes adopted in this Section to the C-band as well because, with respect to these three issues, the rules for protecting FSS in the C-band are similar to the rules in the Ku-band. In changing these rules, we seek to promote the maximum flexibility feasible for ESV operations without causing harmful interference to the FSS. We find no reason to treat the C-band differently from the Ku-band on these issues, and, therefore, we apply the rule changes, as set forth below, to both the C- and Ku-bands.

1. Off-Axis E.I.R.P. Spectral-Density Limits

7. In the *ESV Order*, the Commission adopted off-axis e.i.r.p. spectral-density limits to protect the FSS operators from harmful interference in the C- and Ku-bands.[16] The off-axis e.i.r.p. spectral-density is the power emitted from the ESV antenna in directions other than towards the target satellite. The off-axis e.i.r.p. spectral-density limits define the level of power-density that can be emitted from an ESV antenna as a function of the angle measured from the main axis of the antenna. The off-axis power-density levels emitted by any single ESV antenna must be within the envelope of the e.i.r.p. spectral-density limits. As the Commission stated in the *ESV Order*, the off-axis e.i.r.p. spectral-density limits for ESV transmitters are similar to the limits for transmitters used for very small aperture terminals (VSATs) and are in accordance with the Commission's two-degree satellite spacing framework.[17]

a. Higher Off-Axis Power-Density Levels

8. In its petition, Boeing requests that the Commission allow, under two circumstances, U.S.-licensed ESV operators to operate at off-axis power-density levels that exceed the limits in the

[15] The re-designated rules are located in Appendix B.

[16] *See ESV Order*, 20 FCC Rcd at 698, 716, ¶¶ 55, 99.

[17] *See ESV Order*, 20 FCC Rcd at 698, 716, ¶¶ 55, 99. The *ESV Order* provides an explanation of ESV operations in a two-degree satellite spacing environment. *See ESV Order*, 20 FCC Rcd at 681-684, ¶¶ 13-14.

Commission's rules, up to the levels established in ITU-R Resolution 902 (Resolution 902).[18] First, Boeing claims that higher off-axis power-density levels should be allowed when U.S.-licensed ESVs operate in areas where two-degree spacing is not common, such as in Asia and Europe.[19] Boeing explains that, in regions outside of the United States, satellite operators coordinate to establish adjacent satellite interference limits.[20] Boeing contends that limiting off-axis power-density to levels used in the two-degree spacing environment would hinder the ability of U.S.-licensed ESV operators to compete with foreign operators not subject to two-degree spacing requirements.[21] Second, Boeing claims that ESV operators should be allowed to operate at higher off-axis power-density levels than the Commission's rules permit even in a two-degree spacing environment where ESV operators are able to coordinate higher off-axis power-density levels with adjacent satellite operators.[22] Boeing contends that, under certain circumstances, an ESV licensee may need to supplement its ALSAT operations with authority to coordinate higher off-axis power-density levels with individual U.S. or foreign-licensed satellites.[23] Boeing further states that ESVs operating at higher off-axis power-density levels should be required to coordinate with any future licensees in the band that may be affected and that, without a successful coordination agreement, the ESV operator should be required to operate at lower off-axis power-density levels.[24]

9. Intelsat and other commenters support Boeing's request.[25] Intelsat states that, unlike the other measures adopted in the *ESV Order*, the off-axis power-density levels are not meant to protect the FS, but rather, to protect the FSS, which already receive protection pursuant to the terms of coordination agreements.[26] Intelsat claims that the Commission's rules "create a regulatory disparity that serves no technical purpose."[27] Intelsat further argues that the Commission's other rules allow such flexibility in the C- and Ku-bands as long as there is no adverse impact on adjacent coordinated satellites.[28] No commenters oppose Boeing's request.

10. *Discussion.* We grant Boeing's request to allow U.S.-licensed ESV operators to transmit at off-axis power-density levels that exceed the off-axis e.i.r.p. spectral-density limits as long as they comply with the certification and cessation of emission requirements discussed below.[29] In the *ESV*

[18] Resolution 902, entitled "Provisions relating to earth stations located on board vessels which operate in fixed-satellite service networks in the uplink bands 5925-6425 MHz and 14-14.5 GHz," was adopted at the 2003 World Radio Conference (WRC-03) and contains the international technical provisions related to ESV operations.

[19] Boeing Petition at 8.

[20] Boeing Petition at 8-9.

[21] Boeing Petition at 10.

[22] Boeing Petition at 8.

[23] Boeing Petition at 12-13.

[24] Boeing Petition at 14.

[25] *See* Intelsat Opposition at 10-14; ARINC Opposition at 1 n.1; MTN Opposition at 3 & n.7.

[26] Intelsat Opposition at 11.

[27] Intelsat Opposition at 11.

[28] Intelsat Opposition at 12 & n.36 (citing 47 C.F.R. §§ 25.143(a)(2), 25.134(b), 25.138(b)).

[29] We note that Boeing's higher off-axis power-density proposal pertains to the side lobes, and not the main beam, of the ESV antenna. ESV applicants may increase the main beam e.i.r.p. without increasing the off-axis e.i.r.p. spectral-density by using a larger antenna.

Order, the Commission declined to adopt Boeing's request for higher off-axis power-density levels. The record at that time failed to include sufficient information about the public interest reasons for allowing ESV operators to have flexibility with respect to off-axis power-density levels.[30] However, Boeing now has provided information demonstrating that higher off-axis power-density levels that comply with the terms of coordination agreements are in the public interest.[31] Accordingly, we modify the Commission's decision in the *ESV Order* and allow ESV operators to transmit at higher off-axis power-density levels in and outside of a two-degree spacing environment in the C- and Ku-bands as long as they comply with the certification and cessation of emission requirements set forth below. We note that our decision to allow ESV operators greater flexibility to transmit at higher off-axis power-density levels does not alter the obligation of ESV operators to comply with Section 25.204(h) and Section 25.204(i) of the Commission's rules, which limits both the total power and power-density levels towards the radio horizon in order to protect incumbent FS operations and the National Aeronautics and Space Administration's (NASA) space research Tracking and Data Relay Satellite System (TDRSS) operations, respectively.[32]

11. We agree with Boeing that allowing ESVs to operate at higher off-axis power-density levels that fall within the parameters of a coordination agreement provides greater operational flexibility while ensuring that adjacent satellite operators are protected from harmful interference.[33] We also agree with Boeing that allowing higher off-axis power-density levels will enable U.S.-licensed ESV operators to compete with foreign competitors in areas of the world where two-degree spacing is not common.[34] In addition, as Boeing points out, because higher power-density operations permit greater communication capacity, allowing ESVs to transmit at higher off-axis power-density levels ensures that ESVs have the operating capacity to provide quality service to their end-users.[35] Further, we agree with Boeing that the target satellite operator may have already coordinated higher off-axis power-density levels for other earth stations, and, thus, allowing ESVs to operate at the agreed upon off-axis power-density levels should not cause harmful interference to adjacent satellites.[36] We note that if the target satellite operator is unable to complete a coordination agreement with future adjacent satellite operators located within six degrees of the target satellite operator, we require the ESV operator to operate at off-axis power-density levels in accordance with the off-axis e.i.r.p. spectral-density limits contained in the ESV rules.[37] Finally, as Boeing notes, ESV operators seeking to operate at higher off-axis power-density levels may not access

[30] *See* Boeing Petition at 4-5 n.12. In fact, Boeing provided very little justification in its comments to the *ESV NPRM* for allowing ESV operators to coordinate higher off-axis power-density levels and no other party addressed this issue. *See* Boeing Comments to the *ESV NPRM* at 20 (filed Feb. 23, 2004).

[31] We also find that it serves the public interest to reconsider this issue. *See* 47 C.F.R. § 1.429(b)(3) (allowing review of an issue previously considered by the Commission when it serves the public interest).

[32] *See* 47 C.F.R. §§ 25.204(h), 25.204(i).

[33] *See* Boeing Petition at 6; *see also* Intelsat Opposition at 11 n.34 (stating that the coordination agreements increase operational flexibility).

[34] *See* Boeing Petition at 10.

[35] *See* Boeing Petition at 11, 13.

[36] *See* Boeing Petition at 13.

[37] *See* 47 C.F.R. §§ 25.221, 25.222. This decision is consistent with the Commission's technical requirements for non-ESV, non-conforming earth stations. *See* 47 C.F.R. § 25.220(e)(2).

satellites pursuant to ALSAT authority, and, therefore, must specifically list all of the satellites in their application that they plan to access at higher off-axis power-density levels.[38]

12. To further promote flexibility, we allow the ESVs to operate at any off-axis power-density level that falls within the parameters of the target satellite operator's coordination agreements instead of adopting the off-axis power-density limits set forth in Resolution 902 as the maximum limits, as Boeing proposes. As the Commission stated in the *Part 25 Streamlining 5th R&O*, ". . . [if an] earth station operator can successfully coordinate its operations with an [off-axis e.i.r.p. spectral]-density greater than [a Commission-imposed limit], then we see no reason to preclude the earth station from operating at that [off-axis] power-density level with the particular target satellite that has been coordinated."[39]

b. Certification of Higher Off-Axis Power-Density Levels

13. Boeing contends that U.S. ESV applicants should be allowed to demonstrate compliance with coordination agreements by filing a certification from the serving or target satellite operator stating that higher off-axis e.i.r.p. spectral-density levels have been accepted by neighboring satellite systems through the coordination process.[40] Boeing reasons that submitting the actual coordination agreements to the Commission would be complicated because foreign satellite operators would not be expected to submit such agreements and the Commission would not approve of U.S. coordination agreements being submitted to foreign governments under similar circumstances.[41] Boeing claims that ESV applicants should be required to provide the same information that other earth stations that operate at higher off-axis power-density levels are required to provide, as set forth in Section 25.220(e)(1). Accordingly, Boeing proposes that the Commission either incorporate ESVs into Section 25.220(e)(1), which contains certification requirements, or copy the certification requirements of Section 25.220(e)(1) into Section 25.222.[42] No commenter opposes Boeing's request.

14. *Discussion.* We adopt Boeing's proposal to allow ESV applicants to file certifications with respect to coordination agreements providing for off-axis power-density levels that exceed the off-axis e.i.r.p. spectral-density limits.[43] In particular, we amend Sections 25.221 and 25.222 to require those ESV applicants to file the following certifications: (1) a statement from the target satellite operator acknowledging that the proposed ESV operation has the potential to create interference to adjacent satellite networks that may be unacceptable; (2) a statement from the target satellite operator that the ESV operations will not violate existing coordination agreements with adjacent satellites within six degrees longitude of the target satellite; and (3) a statement from the target satellite operator that it will include the off-axis power-density levels of the ESV applicant in all future coordination agreements.

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[38] A U.S.-licensed earth station with ALSAT authority is allowed to access any space station on the Permitted Space Station List as long as it complies with the Commission's technical requirements and the conditions of its license. *See Amendment of the Commission's Regulatory Policies to Allow Non-U.S.-Licensed Space Stations to Provide Domestic and International Satellite Service in the United States*, IB Docket No. 96-111, First Order on Reconsideration, FCC 99-325, 15 FCC Rcd 7207, 7214-16, ¶¶ 16-20 (1999).

[39] *2000 Biennial Regulatory Review -- Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage By, Satellite Network Earth Stations and Space Stations*, Fifth Report and Order in IB Docket No. 00-248 and Third Report and Order in CC Docket No. 86-496, FCC 05-63, 20 FCC Rcd 5666, 5692, ¶ 65 (2005) (*Part 25 Streamlining 5th R&O*).

[40] Boeing Petition at 14.

[41] Boeing Petition at 14.

[42] Letter from Carlos M. Nalda, Counsel for Boeing, to Marlene H. Dortch, Secretary, FCC (dated July 6, 2006).

[43] Boeing Petition at 14-16.

These certifications should be obtained from the target satellite operator and will be based upon coordination agreements that exist between the target satellite operator and potentially affected operators of satellites within six degrees longitude of the target satellite. The certification requirement allows us to eliminate the burden of filing entire coordination agreements with the Commission, while ensuring that the higher off-axis power-density levels will not cause harmful interference to adjacent satellite operations.

15. In its effort to operate at higher off-axis power-density levels and obtain certifications from the target satellite operator, the ESV operator shall provide the target satellite operator with information about the ESV's operations to determine if the ESV's higher off-axis power-density levels fall within the parameters of the coordination agreements that exist between the target satellite operator and satellites operating within six degrees longitude of the target satellite. This information could take a number of forms, but must be sufficient for the target satellite operator to determine the off-axis power-density values of the ESV transmitter. If the ESV's operations are not within the parameters of the coordination agreements, we expect that the target satellite operator will either negotiate with the operators of neighboring satellites to modify the coordination agreements to include the ESV's operational parameters or inform the ESV that it cannot operate pursuant to the parameters given to the target satellite operator.

16. Because the ESV operator may not have access to the details of the target satellite operator's coordination agreements, we require the ESV operators to remain within the power-density values that it gives to the target satellite operator. We also require the ESV operator to cease transmission within 100 milliseconds[44] if it exceeds the off-axis power-density values given to the target satellite operator to ensure that it does not violate the target satellite operator's coordination agreements. If the ESV exceeds the power-density values given to the target satellite operator, there is the potential that the ESV operator would be in violation of the target satellite operator's coordination agreements and could possibly cause harmful interference to neighboring satellites. Thus, if the ESV transmitter exceeds the off-axis power-density values given to the target satellite operator, whether due to an excessive antenna pointing error or some other factor, the ESV transmitter must cease transmitting until it is back in compliance with the relevant coordination agreement.

2. ESV Antennas

17. We address below, in three separate sections, proposals with respect to the antenna pointing error requirement. In the first section, we deny ARINC's request to eliminate the antenna pointing error requirement because we find that, for some ESV operations, the antenna pointing error requirement is needed to protect the FSS. However, we recognize that not all ESV operators may need to follow this requirement in order to protect the FSS. Therefore, in the second and third sections, we adopt two variations on the antenna pointing error requirement: one variation we adopt based on our review of ARINC's Technical Appendix, which would allow ESVs that operate with a constant level of power and use low power techniques, to declare a maximum antenna pointing error that exceeds 0.2 degrees. The other variation we adopt is based on a proposal by Intelsat to allow ESV operators to exceed the 0.2 degree antenna pointing error requirement if those operators simultaneously reduce their power by a proportionate amount. Adopting these variations to the antenna pointing error requirement will provide ESVs with greater operational flexibility, and will also ensure that the FSS will continue to be protected

[44] Because ESVs operating within the off-axis e.i.r.p. spectral-density limits and following the antenna pointing rules must cease emissions within 100 milliseconds, we require ESVs that operate at power levels that exceed the off-axis e.i.r.p. spectral-density limits also to cease emissions within 100 milliseconds. *See* 47 C.F.R. §§ 25.221(a)(7), 25.222(a)(7). The Commission has re-designated Sections 25.221(a)(7) and 25.222(a)(7) as Sections 25.221(a)(1)(iii) and 25.222(a)(1)(iii) in Appendix B.

from harmful interference.

a. Antenna Pointing Error Requirement

18. In the *ESV Order*, the Commission adopted Sections 25.221(a)(6) and 25.222(a)(6) in the C- and Ku-bands, respectively, to limit the ESV antenna pointing error in order to protect adjacent satellites from harmful interference.[45] The antenna pointing error rule requires each ESV operator to maintain an antenna pointing error within 0.2 degrees between the intended target satellite and the axis of the ESV antenna's main lobe. Limiting the ESV antenna pointing error helps to control the antenna-centric, off-axis e.i.r.p. spectral-density in the direction of the satellites operating adjacent to the ESV's target satellite. Antenna mispointing may result from the rapid movement of the vessel, a time-lag in the antenna tracking mechanism or an insensitivity of the tracking software to the precise direction of the satellite as seen from the vessel.

19. In its petition, ARINC contends that the antenna pointing error requirement in Section 25.222(a)(6) is unnecessary because Section 25.222(a)(1)-(4), which contains the off-axis power-density limits, already specifies the maximum permissible power-density from the ESV at every point in the geostationary satellite orbit (GSO) arc and, therefore, makes the antenna pointing error requirement logically inconsistent and unnecessary.[46] ARINC states that the Commission, in the *ESV Order*, declined to adopt a minimum antenna size based on its conclusion that the off-axis power-density limits would protect adjacent satellites.[47] ARINC claims that the same reasoning applies to removing the antenna pointing error requirement in Section 25.222(a)(6).[48] In addition, ARINC contends that Figure 1 of its Technical Appendix demonstrates that even when the antenna is mispointed many times the 0.2-degree limit, no harmful interference occurs to adjacent satellites as long as the off-axis power-density limits are not exceeded.[49] According to ARINC, the antenna pointing error requirement hinders technological advancement because it does not provide ESV operators with maximum flexibility to find innovative ways to prevent harmful interference.[50]

20. Intelsat and MTN do not support ARINC's proposal to remove the antenna pointing error requirement.[51] Intelsat agrees that there should be flexibility in the way that ESVs protect adjacent satellites, but does not support removal of this requirement.[52] Intelsat claims that ARINC is incorrect in assuming that the off-axis e.i.r.p. spectral-density limit takes the antenna pointing error into account.[53] Intelsat contends that the "envelopes represent the addition of the maximum power-density levels at the

[45] The Commission has re-designated Sections 25.221(a)(6) and 25.222(a)(6) as Sections 25.221(a)(1)(ii)(A) and 25.222(a)(1)(ii)(A). *See* Appendix B.

[46] ARINC Petition at 3. We note that ARINC, which has authority to provide aeronautical mobile satellite service (AMSS), has made a similar request in the AMSS proceeding. *See* ARINC comments filed in IB Docket No. 05-20 (July 5, 2005). We will consider that request separately based on the record of that proceeding, not based on the outcome of this proceeding.

[47] ARINC Petition at 4.

[48] ARINC Petition at 4.

[49] ARINC Petition at 5 & Appendix (Figure 1).

[50] ARINC Petition at 6.

[51] *See* Intelsat Reply at 5; MTN Opposition at 4.

[52] Intelsat Reply at 5.

[53] Intelsat Opposition at 16.

input of the transmit antenna and the antenna off-axis gain envelope specified in the Commission rules."[54] Intelsat further maintains that the off-axis power-density limits regulate antenna performance, not the direction that the antenna is pointed.[55] MTN opposes ARINC's proposal, stating that the pointing error requirement is necessary because less accurate pointing will increase the potential for off-axis emission in excess of the current limits that could lead to adjacent satellite interference.[56]

21. *Discussion.* We decline to adopt ARINC's proposal to remove the antenna pointing error requirement. The ESV service is a mobile service operating in FSS frequency bands. As such, the platform supporting the ESV antenna is subject to motions and vibrations which may cause rapid movement and mispointing of the antenna. To help ensure that satellites adjacent to the target satellite are not subject to interference, we maintain the antenna pointing error requirement for ESVs adopted by the Commission. As a result, we find that, for ESV operators that transmit at off-axis power-density levels close to the maximum permitted off-axis power-density limits, the existing antenna pointing error requirement is necessary to protect the FSS satellites near the target satellite from harmful interference.

22. However, we find that ARINC's interpretation of the e.i.r.p. "envelope" as specifying the maximum e.i.r.p. spectral-density towards every point on the GSO to be a more practical method for determining the amount of power received at an adjacent satellite than under the off-axis e.i.r.p. spectral-density rules, which specify the maximum e.i.r.p. spectral-density based on the off-axis angle from the axis of the ESV antenna's main lobe.[57] Moreover, ARINC's interpretation is consistent with the Commission's 2008 decision to revise the definition of the off-axis e.i.r.p. spectral-density envelope for FSS earth stations in the *Part 25 Streamlining 8th R&O*.[58] We, therefore, adopt ARINC's interpretation of the e.i.r.p. envelope by modifying the off-axis e.i.r.p. spectral-density rules contained in Sections 25.221 and 25.222. Although ARINC is incorrect in assuming that the off-axis e.i.r.p. spectral-density limits adopted in the *ESV Order* specify the maximum permissible power-density from the ESV at every point in the GSO arc or take the pointing error into account,[59] we find that revising those limits to specify the e.i.r.p. spectral-density towards each point on the GSO would make the ESV rules more logically

[54] Intelsat Opposition at 16.

[55] Intelsat Opposition at 17. We note that, as discussed later in this Section, Intelsat proposes an increase of the antenna pointing error requirement based on a proportionate reduction in ESV transmitting power. *See* Intelsat Reply at 6; *see also* Intelsat Feb. 14 *Ex Parte* Letter at 2.

[56] MTN Opposition at 4.

[57] In Appendix B, we re-designate the off-axis e.i.r.p. spectral-density rules in Sections 25.221(a)(1)-(4) and 25.222(a)(1)-(4) as Sections 25.221(a)(1)(i)(A)-(D) and 25.222(a)(1)(i)(A)-(D), and revise the definition of theta (Θ) in those rules, as set forth in this Order on Reconsideration.

[58] *See 2000 Biennial Regulatory Review -- Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage By, Satellite Network Earth Stations and Space Stations*, Eighth Report and Order and Order on Reconsideration, FCC 08-246, ¶ 24 n.90 (rel. October 17, 2008) (*Part 25 Streamlining 8th R&O)*.

[59] The off-axis e.i.r.p. spectral-density limits adopted in the *ESV Order* specify a maximum e.i.r.p. spectral-density level in relation to a specific off-axis angle. The off-axis angle is given in the Commission's rules by the Greek letter theta (Θ). The angle theta is defined in Section 25.222(a)(1) by the statement: "where Θ is the angle in degrees from the axis of the main lobe." According to this definition, the reference for the off-axis e.i.r.p. spectral-density limit is the main lobe, or equivalently, the main beam of the ESV antenna. Therefore, under this definition, as the antenna pivots, the off-axis power-density pivots with the antenna and the off-axis power-density received at a given point on the geostationary orbit changes. Accordingly, it is the combined off-axis power-density and the antenna pointing error requirement that control the maximum interference received by adjacent satellites. *See also* Intelsat Opposition at 16-17.

consistent with protecting adjacent FSS satellites from interference. Accordingly, we revise the off-axis e.i.r.p. spectral-density limits for ESVs to specify the maximum permissible power-density from the ESV at every point in the GSO arc. We accomplish this by revising the definition of the off-axis e.i.r.p. spectral-density envelope to be based on a line from the focal point of the ESV antenna to the target satellite.[60]

b. Exceeding the Antenna Pointing Error Requirement

23. Although we decline to remove the antenna pointing error requirement, we agree with ARINC that some ESV systems may be capable of exceeding the 0.2 degree antenna pointing error requirement without causing harmful interference to the FSS.[61] In particular, as discussed above, ESVs that operate with a constant level of power and use low power-density techniques may be capable of having a pointing error that is greater than 0.2 degrees without exceeding the off-axis e.i.r.p. spectral-density limits that protect FSS satellites adjacent to the target satellite. However, we disagree with ARINC that all ESVs using low power-density techniques could point in any direction without potentially causing harmful interference. Therefore, we require ESVs that operate with a constant level of power, using low power-density techniques, and requesting relaxed pointing restrictions to declare and abide by a maximum antenna pointing error which may be larger than 0.2 degrees.

24. We agree with ARINC that the antenna pointing error requirement in the rules is excessive for ESV systems capable of mispointing more than 0.2 degrees without violating the off-axis e.i.r.p. spectral-density limits contained in Sections 25.221 and 25.222.[62] ARINC illustrates this point in Figure 1 of the Technical Appendix in its petition.[63] We note that the maximum off-axis e.i.r.p. spectral-density of the transmitter shown in ARINC's Figure 1 is more than 20 dB below the maximum off-axis e.i.r.p. spectral-density limits and as ARINC points out, "[e]ven when mispointed by 4 degrees (many times the 0.2[-degree] value in [Section 25.222(a)(1)(ii)(A)]), the terminal does not encroach on the off-axis E.I.R.P. limit."[64] Thus, we agree that using low power-density techniques may allow any single antenna to be pointed more than 0.2 degrees away from the target satellite without exceeding the off-axis e.i.r.p. spectral-density limits that protect adjacent satellites from harmful interference. However, we note, as Figure 1 of ARINC's Technical Appendix also illustrates, that although the transmitter does not exceed the off-axis e.i.r.p. spectral-density limits when the pointing error is 4 degrees, it does exceed those limits when the pointing error is 6 or more degrees.[65] Thus, even ESVs using power-densities well below the off-axis e.i.r.p. spectral-density limits set forth in Sections 25.221 and 25.222 could cause harmful interference due to an excessive pointing error.

25. Consequently, instead of eliminating the antenna pointing error requirement, we relax the antenna pointing error requirement in order to permit more flexibility for implementing these systems. In particular, ESV applicants that request to operate with a pointing error that is greater than 0.2 degrees must declare and justify, in their application, the maximum antenna pointing error that will be achieved

[60] *See* Sections 25.221(a)(1)(i) and 25.222(a)(1)(i) in Appendix B.

[61] *See* ARINC Petition, Technical Appendix. We note that, although ARINC did not directly argue this point in its petition, we derived its intent from the example in Figure 1 and the related discussion in its Technical Appendix.

[62] *See* 47 C.F.R. §§ 25.221, 25.222.

[63] *See* ARINC Petition, Technical Appendix.

[64] ARINC Petition, Technical Appendix at 1-2.

[65] *See* ARINC Petition, Technical Appendix. ARINC points out that "[t]his is particularly true for very small aperture antennas where required compliance with the [off-axis e.i.r.p. spectral-density] mask already results in significant backoff in the radiated power-[density]." *Id.*

without exceeding the off-axis e.i.r.p. spectral-density limits. The maximum pointing angle associated with this self-declared antenna pointing error should be less than or equal to the angle at which the transmission exceeds the off-axis e.i.r.p. spectral-density limits. The ESV applicant must technically demonstrate how the overall system will operate within the off-axis e.i.r.p. spectral-density limits taking into account the declared antenna pointing error and the low power-density emissions.[66] This approach provides flexibility for those ESV systems by allowing the ESV operators to prevent interference through the control and management of the off-axis power-density from the ESV terminal. This approach also should encourage innovation for a broad range of ESV applications and ensure that the FSS satellites will be protected.

26. In addition, we require ESVs that declare a maximum antenna pointing error to shut down within 100 milliseconds if they exceed the declared antenna pointing error. By permitting the ESV applicant to declare and justify a maximum antenna pointing error, we provide the ESV applicant with the opportunity to include sufficient margin within that declared maximum antenna pointing error so that an individual ESV should be able to cease transmissions if it exceeds the declared antenna pointing error. If we allow an individual antenna to exceed the declared antenna pointing error, the likelihood of harmful interference to the adjacent satellites significantly increases because exceeding the declared antenna pointing error could result in the ESV operator violating the off-axis e.i.r.p. spectral-density envelope. Accordingly, ESVs must cease transmissions if they exceed the declared antenna pointing error. Because ESVs following the existing off-axis e.i.r.p. spectral-density envelope and pointing rules are required to cease emissions within 100 milliseconds when the antenna pointing error exceeds 0.5 degrees, we will require the low power-density transmitter also to cease emissions within 100 milliseconds if they exceed the declared antenna pointing error.

c. Alternative Antenna Pointing Approach

27. Finally, as mentioned above, Intelsat proposes a variation of the antenna pointing error requirement in which the antenna would be allowed to point more than 0.2 degrees away from the target satellite if the ESV simultaneously reduces the power of the ESV transmitter by a proportionate amount.[67] We agree that reducing the power would be effective in avoiding harmful interference to adjacent satellite operators if the ESV operator exceeds the antenna pointing error requirement. Therefore, we allow ESV applicants to demonstrate, in their applications, how they can reduce the off-axis e.i.r.p. spectral-density emissions to stay within the off-axis e.i.r.p. spectral-density limits when their antenna mispoints by more than 0.2 degrees. This approach requires that ESVs be capable of controlling their power dynamically, *i.e.*, their systems may automatically increase or decrease power depending on the pointing of the antenna. In addition, similar to ESVs that operate with a constant level of power and use low power-density techniques, we require these ESV applicants to declare and justify a maximum antenna pointing error and to cease emissions within 100 milliseconds if they exceed that declared antenna pointing error. Upon receiving an application containing a technical demonstration of this type, the Commission will review it to determine if it is acceptable for filing. After such review, the Commission will place it on public notice. After obtaining public comment, and after technically reviewing the demonstration and the public comments, the Commission will decide if the proposed specific implementation of the off-axis pointing and dynamic power control will protect adjacent satellite systems.

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[66] The precise value of the declared antenna pointing error would depend on the off-axis e.i.r.p. spectral-density pattern being transmitted by the ESV transmitters, the number of ESV transmitters operating co-frequency, if any, and the statistical accuracy of the antenna tracking system(s).

[67] Intelsat Reply at 6; *see also* Intelsat Feb. 14 *Ex Parte* Letter at 2.

3. Starting Angle of the Off-Axis E.I.R.P. Spectral-Density Envelope

28. The off-axis e.i.r.p. spectral-density limits adopted in the *ESV Order* include a starting angle along the GSO plane of 1.0 degree for the C-band and 1.25 degrees for the Ku-band.[68] The off-axis e.i.r.p. spectral-density limits set forth the maximum power-density that an ESV antenna can radiate at various angles from the antenna main beam. The smallest off-axis angle at which the limits apply, *i.e.*, the angle nearest the antenna bore sight, is considered the "starting angle" of the off-axis e.i.r.p. spectral-density limit. The off-axis e.i.r.p. spectral-density limits begin several tenths of a degree away from the target satellite because those limits protect satellites adjacent to the target satellite.[69] The larger the starting angle, the more freedom the ESV operator has in selecting the gain and other characteristics of the ESV antenna.

29. In its opposition, Intelsat proposes that the Commission increase the starting angle along the GSO plane to 1.5 degrees. Intelsat claims that its proposal is consistent with the Commission's conclusion, adopted subsequently in the 2005 *Part 25 Streamlining 6th R&O*, to begin the C- and Ku-band antenna gain pattern envelopes at 1.5 degrees.[70] Intelsat claims that extending the angle at which the envelope commences would be consistent with the Commission's rules and would promote the use of smaller ESV antennas while continuing to protect adjacent satellites.[71] Boeing supports a 1.5-degree starting point for the ESV off-axis e.i.r.p. spectral-density envelope.[72] No party opposes Intelsat's proposal.

30. *Discussion.* We adopt Intelsat's proposal to change the starting angle of the off-axis e.i.r.p. spectral-density limits along the GSO plane for ESVs operating in the C- and Ku-bands to 1.5 degrees, consistent with the *Part 25 Streamlining 6th R&O*.[73] We agree with Intelsat that this starting angle gives ESVs more operational flexibility by allowing the use of smaller antennas while still ensuring that adjacent satellites will be protected. In particular, the starting angle of the e.i.r.p. spectral-density limits effectively determines the maximum size of the main beam of the ESV antenna that is used. Small

[68] *See* 47 C.F.R. §§ 25.221(a)(1), 25.222(a)(1); *see also ESV Order*, 20 FCC Rcd at 698, 716, ¶¶ 55, 99. The Commission has re-designated Sections 25.221(a)(1) and 25.222(a)(1) as Sections 25.221(a)(1)(i)(A), 25.222(a)(1)(i)(A). *See* Appendix B.

[69] These "off-axis" limits do not address the antenna main beam e.i.r.p. power-density.

[70] Intelsat Opposition at 18 (citing *2000 Biennial Regulatory Review – Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, Spectrum Usage by, Satellite Network Earth Stations and Space Stations*, IB Docket No. 00-248, FCC 05-62, Sixth Report and Order and Third Further Notice of Proposed Rulemaking, 20 FCC Rcd 5539 (2005)). *See also* Intelsat Feb. 14 *Ex Parte* Letter at 2.

[71] Intelsat Opposition at 18.

[72] Boeing Reply at 8.

[73] *See 2000 Biennial Regulatory Review – Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage By, Satellite Network Earth Stations and Space Stations*, IB Docket No. 00-248, Sixth Report and Order and Third Further Notice of Proposed Rulemaking, FCC 05-62, 20 FCC Rcd at 5593 (2005) (*Part 25 Streamlining 6th R&O*). We note that, in addition to concluding that the starting angle of the e.i.r.p. spectral-density along the GSO plane should be changed to 1.5 degrees, we also concluded that the starting angle in directions off the GSO plane should be 3.0 degrees and that the backlobe gain of the antenna should be increased by 10 dB for off-axis angles exceeding 85 degrees. *See id.* at 5604, 5610, 5611, ¶¶ 22, 37, 41. *See also Part 25 Streamlining 8th R&O*, ¶¶ 23, 27; 47 C.F.R. § 25.218(f). Therefore, consistent with the Part 25 Streamlining proceeding, we change, in the C- and Ku-bands, the starting angle in all directions outside the GSO plane to 3.0 degrees and increase by 10dB, in the Ku-band only, the backlobe gain of the antenna for off-axis angles exceeding 85 degrees along the GSO plane and in all directions outside the GSO plane.

antennas have large main beams. As a result, increasing the starting angle means that ESV operators may use smaller ESV antennas while still protecting adjacent satellites from harmful interference.

31. We also find that some of the reasoning for allowing a 1.5-degree starting angle in the *Part 25 Streamlining 6th R&O* applies here.[74] As the Commission stated in that Order, the difference in size between geocentric and topocentric angles helps to ensure that earth stations protect adjacent satellites from harmful interference. The geocentric angle, which is measured from the center of the earth, is nominally 2.0 degrees between satellites along the GSO plane. The topocentric angle between two satellites is measured from the earth station on the earth's surface and results in a larger angle than the geocentric angle. The topocentric angle between satellites is usually between 2.1 degrees and 2.2 degrees, depending on the earth station's angle of elevation.[75] Because satellites must maintain an orbital longitude within 0.05 degrees of their assigned orbital location, adjacent satellites at closest approach would be separated by at least a 2-degree topocentric angle.[76] In addition, the cessation of emission limit for ESVs is 0.5 degrees.[77] Thus, setting the starting angle at 1.5 degrees off-axis, along with an ESV cessation of emissions limit at 0.5 degrees, will limit potential interference into satellites separated by a 2-degree geocentric angle. ESV applicants that declare their own antenna pointing error and cease emissions at an angle greater than 0.5 degrees will have to demonstrate to the Commission how they will protect adjacent satellites from their single or aggregate transmitter emissions.[78]

B. Measures Protecting FS Operations in the C-band

32. In this Section, we consider MTN's and the FWCC's requests that we reconsider various ESV requirements for protecting the FS in the C-band. First, we address MTN's proposals to: (1) modify the requirement to coordinate within 200 kilometers so that the 200 kilometers is only measured from the coastline of the United States and not also measured from an offshore FS station; (2) clarify that Section 25.221(e) applies to *U.S.-licensed* FS operations; (3) modify the requirement to announce, in a public notice, the coordination between the ESV and FS operators by only allowing FS inadvertently excluded from the coordination, and not just any member of the public, to object to the continuation of the ESV operation; (4) require that, in response to an objection received from an FS operator, the ESV operator must cease transmission only on the frequencies that the FS operator demonstrates has been affected; and (5) require the objecting FS operator to demonstrate that: (a) it was inadvertently excluded from the coordination; and (b) harmful interference would occur if the ESV did not cease operations. We also review the FWCC's request that we modify our rules regarding the amount of spectrum that ESVs could coordinate individually and collectively at a particular location. Finally, we decline to address certain requests raised by the FWCC that the Commission previously considered in the *ESV Order* (*i.e.*, ESV use of the C-band on in-land waterways).

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[74] *See Part 25 Streamlining 6th R&O*, 20 FCC Rcd at 5604, ¶ 22.

[75] *See 2000 Biennial Regulatory Review -- Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage by, Satellite Network Earth Stations and Space Stations*, IB Docket No. 00-248, Further Notice of Proposed Rulemaking, FCC 02-257, 17 FCC Rcd 18585, 18640-41 (2002).

[76] *See* 47 C.F.R. § 25.210.

[77] *See* 47 C.F.R. §§ 25.221(a)(7), 25.222(a)(7). The Commission has re-designated Sections 25.221(a)(7) and 25.222(a)(7) as Sections 25.221(a)(1)(ii)(B) and 25.222(a)(1)(ii)(B). *See* Appendix B.

[78] *See supra* ¶¶ 23-27.

1. Distance from Offshore FS Stations

33. In the *ESV Order*, the Commission adopted Section 25.221(e)[79] which requires, in part, ESV operators to coordinate with FS stations when operating within 200 kilometers (km) (or 125 miles) of the coastline of the United States.[80] Section 25.221(e) also requires ESV operators to coordinate when they operate within 200 km from FS offshore installations.[81] The Commission reasoned that a distance of 200 km ensures that FS operations receive adequate protection, without unduly burdening the ESV operators.[82] The Commission also concluded that measuring 200 km from offshore FS installations, and not just from the U.S. coastline, would ensure that those FS offshore facilities receive adequate protection from ESV operations.[83]

34. MTN proposes that we eliminate our requirement for coordination when operating within 200 km of an offshore FS station. MTN contends that, under Section 25.221(e), ESV operators would have to coordinate with FS offshore stations if the ESV travels within 200 km of those FS, regardless of how far the offshore FS operations are from the U.S. baseline.[84] MTN claims that, as a result, the rule essentially requires ESVs to coordinate with FS offshore stations located outside the baseline of the United States. According to MTN, this obligation is not imposed on non-U.S. ESV licensees; may be inconsistent with Resolution 902 (WRC-03); and may unintentionally protect non-U.S. licensed FS offshore operations.[85] In addition, MTN argues that the "fixed service offshore installation" provision in Section 25.221(e) fails to distinguish between U.S.-licensed and non-U.S.-licensed FS operations.[86] Therefore, MTN proposes to modify the first sentence in Section 25.221(e) by removing the phrase "or within 200 km from a fixed service offshore installation, shall complete coordination" to reflect that the minimum distance is only measured from the baseline and not from FS offshore installations. In that same sentence, MTN also proposes to add the phrase "with all potentially affected U.S. fixed-service licensees (including U.S. licensees of fixed-service offshore installations)" to reflect that ESVs are required to coordinate with potentially affected U.S.-licensed FS and offshore FS operations prior to operation.[87]

35. Intelsat agrees that this portion of Section 25.221(e) ". . . contains certain ambiguities, and disparities with the provisions of Resolution 902."[88] In particular, Intelsat agrees that the provision does not: (1) explicitly apply to offshore FS installations near the U.S. coastline or to U.S.-licensed FS installations; and (2) encompass non-U.S. ESV operators. Intelsat claims that Section 25.221(e) should

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[79] The Commission has re-designated Section 25.221(e) as Section 25.221(a)(11). *See* Appendix B.

[80] Under Resolution 902, the seaward ESV line/boundary is calculated from the "low water mark." In the United States, the "low water mark" is known as the "coastline" or "baseline." Baseline points include the main shore, islands and "low water elevations" such as natural rocks. Baseline points may change due to storms or ocean currents, requiring adjustments to those baseline points. *See ESV Order*, 20 FCC Rcd at 685 n.69.

[81] *ESV Order*, 20 FCC Rcd at 686-687, ¶ 24.

[82] *ESV Order*, 20 FCC Rcd at 687, ¶ 25.

[83] *ESV Order*, 20 FCC Rcd at 687, ¶ 24.

[84] MTN Petition at 6. The baseline is also known as the coastline. *See* 47 C.F.R. § 25.201.

[85] MTN Petition at 6.

[86] MTN Petition at 6.

[87] MTN Petition, Attachment.

[88] Intelsat Opposition at 23.

be clarified, most importantly, to state that the coordination requirements do not apply to non-U.S.-licensed offshore FS stations.[89]

36. The FWCC, however, opposes MTN's proposal to eliminate the requirement for ESVs to coordinate when operating within 200 km from FS offshore installations. The FWCC argues that MTN provides no justification for exposing offshore FS stations to a high risk of interference.[90] The FWCC claims that an offshore FS station located 160 km away from the coast could be exposed to ESVs not subject to coordination and operating just 40 km away on open seas.[91] The FWCC also claims that at least one offshore FS station is located 220 km from the U.S coastline and would be excluded from coordination altogether.[92] The FWCC contends that international regulations provide no support for MTN's position because ITU-R Recommendation SF.1585 requires the 300 km coordination distance to include the distance from "man-made offshore structures."[93] MTN counters that ITU-R Recommendation SF. 1585 is not a mandate and, in any case, has been superseded by Resolution 902 (WRC-03), which established that the minimum distance would be measured from the low-water mark as defined in the United Nations Convention on the Law of the Sea, which prohibits territorial authority to extend beyond 12 nautical miles from the low-water mark.[94]

37. *Discussion.* We decline to adopt MTN's proposal to remove from Section 25.221(e), now re-designated as Section 25.221(a)(11),[95] the requirement for ESVs to coordinate when operating within 200 km from offshore FS installations. As discussed in the *ESV Order*, the purpose of measuring the 200-km distance from U.S.-licensed offshore FS installations is to ensure that ESVs protect those offshore FS operations from harmful interference.[96] We agree with the FWCC that MTN's proposed changes would increase the likelihood of interference to the offshore FS operations.[97] MTN fails to provide alternative measures for protecting those offshore FS installations. Without a reasonable alternative for protecting the FS or an explanation as to why offshore FS operators will not be harmed by non-coordinated ESVs traveling within 200 km of the offshore FS stations, we find no basis for adopting MTN's proposal.[98]

38. Nonetheless, we agree with MTN that we should amend Section 25.221(a)(11) to clarify that: (1) the phrase "a fixed service offshore installation" refers to U.S.-licensed FS offshore

[89] Intelsat Opposition at 23.

[90] FWCC Opposition at 4.

[91] FWCC Opposition at 4.

[92] FWCC Opposition at 4.

[93] FWCC Opposition at 4 & n.12 (citing ITU-R Recommendation SF.1585, Section 3.2).

[94] MTN Reply at 4.

[95] *See* Appendix B.

[96] *See ESV Order*, 20 FCC Rcd at 687, ¶ 24.

[97] *See* FWCC Opposition at 4.

[98] With regard to Resolution 902, we recognize that there may be instances when measuring 200 km from U.S.-licensed offshore FS installations results in a coordination area that extends beyond the minimum distance of 300 km adopted in Resolution 902. We also acknowledge, as the FWCC points out, that ITU-R Recommendation SF. 1585 contemplated measuring the minimum coordination distance from the shore, which would include " islands, man-made offshore structures and peninsulas." *See* ITU-R Recommendation SF.1585, Section 3.2; FWCC Opposition at 4 n.12.

installations;[99] and (2) ESVs must coordinate with potentially affected U.S.-licensed FS operators prior to operation. We agree with MTN that Section 25.221(a)(11) could be interpreted as requiring ESVs to coordinate within 200 km of FS offshore installations located anywhere in the world.[100] Therefore, we clarify this portion of Section 25.221(a)(11) to state as follows:

> ESVs operating within 200 km from the baseline of the United States, or within 200 km from a U.S.-licensed fixed service offshore installation, shall complete coordination with potentially affected U.S.-licensed fixed service operators prior to operation.

The amended language that we adopt in Section 25.221(a)(11) ensures that ESVs need to coordinate only with U.S.-licensed FS providers operating in and around the United States and the U.S. territories.

2. Public Notice of ESV Coordination

39. In addition to setting forth distance requirements for coordination, the Commission adopted provisions in Section 25.221(e)[101] that allow ESV operators to commence operation after the release of a public notice (Coordination Public Notice)[102] identifying the details of the completed coordination in the C-band uplink between an ESV operator and FS stations.[103] Under Section 25.221(e), however, if the Commission receives any objections during the 30-day comment cycle following issuance of the Coordination Public Notice, the ESV operator must cease operations of the relevant station until the situation has been resolved and the Commission receives notice of the resolution.[104] The release of the Coordination Public Notice ensures that coordination information is available to all interested parties.[105]

40. MTN requests that we modify the requirement that ESV operators cease operations if the Commission receives an objection during the 30-day comment period. MTN argues that, with respect to requiring ESVs to cease operations when an objection to the coordination is received, Section 25.221(e) is "overbroad and subject to mischief. . ." and, therefore MTN proposes the following changes, as underlined and omitted, to Section 25.221(e):

> If, … prior to the end of the 30-day comment period of the Public Notice, an objection is received from a fixed service licensee in the geographic areas whose specific frequencies were not included in the coordination agreement and that contains a declaration that harmful interference to the reference link would result from continued operation of the ESV network in that geographic area, the licensee shall immediately cease operation of that particular station on the affected frequencies until the coordination dispute is resolved and the ESV licensee informs the Commission of the resolution.[106]

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[99] We also amend Section 25.221(f), now re-designated as Section 25.221(a)(12), to insert "U.S.-licensed" before the phrase "fixed service offshore installation." *See* Appendix B.

[100] *See* MTN Petition at 6.

[101] As noted above, the Commission has re-designated Section 25.221(e) as Section 25.221(a)(11). *See* Appendix B.

[102] *ESV Order*, 20 FCC Rcd at 690, ¶ 33.

[103] *See ESV Order*, 20 FCC Rcd at 690, ¶ 33.

[104] *See* 47 C.F.R. § 25.221(e); *see also ESV Order*, 20 FCC Rcd at 690, ¶ 33.

[105] *ESV Order*, 20 FCC Rcd at 690, ¶ 33.

[106] MTN Petition at 4 & Attachment.

First, MTN proposes that Section 25.221(e) specify that ESVs must cease operations only if the FS operators that were inadvertently excluded from a coordination agreement object to the ESV operation.[107] This proposed provision would replace the provision's more general statement that ESVs must cease operation if objections are received. MTN is concerned that, under the current rule, ESVs would be required to cease operations if "any member of the public" objected to the coordination during the 30-day comment cycle following the release of the Coordination Public Notice.[108] Second, MTN proposes that the Commission should require the ESV to cease operations only on the link or links of the frequencies that a FS operator demonstrates has been affected.[109] Finally, MTN proposes that, prior to being required to cease its ESV operations, the FS operator should demonstrate that it was mistakenly excluded from the coordination and that harmful interference would result from continued ESV operations.[110]

41. Intelsat agrees with MTN.[111] The FWCC disagrees, however, claiming the cessation of emissions requirement provides FS operators with a remedy only if it has been left out of the coordination process or has a potential interference problem with the ESV.[112] The FWCC further claims that FS operators would not have any incentive to abuse its ability to object and indicates that the Commission's rules deter such behavior.[113] MTN counters that shutdown of ESV transmissions may be required, but only when the FS can demonstrate a risk of interference to the affected frequencies.[114]

42. *Discussion.* We agree with MTN that we should clarify the Public Notice requirement in Section 25.221(e) (which we determine in this Order to re-numerate as Section 25.221(a)(11)), but do not agree that the FS should be required to make any specific showings or demonstrations as a prerequisite to ESVs ceasing transmissions. First, we agree with MTN that the Public Notice requirement should specify that only the FS operators that have been excluded from the coordination are allowed to object in response to the Public Notice and only with respect to being excluded from the coordination. The Public Notice of coordination serves to ensure that the FS are included in the coordination at a particular location. We also agree that ESVs should be required to shutdown only those frequencies used by the objecting FS that have been excluded from the coordination. We find no reason to require ESV operations to cease operations on all frequencies at a particular coordinated location.

43. However, to require the FS operators to demonstrate that its frequencies have been affected or that harmful interference will result if ESV operations continue would undermine the purpose of the Public Notice requirement. Since the Public Notice of the coordination serves to ensure that any potentially affected FS operators have been included in the coordination at a particular location, requiring the FS operators to make a demonstration would delay the process for including the FS in the coordination agreement. Moreover, such a requirement would be excessive considering that the FS is requesting to be included in a coordination agreement. A demonstration may be warranted if the FS provider complained of harmful interference or objected to ESV operations taking place outside of the coordination agreement. These matters, however, would be handled by the frequency coordinator, or the

[107] *See* MTN Petition at 4-5.

[108] *See* MTN Petition at 4-5.

[109] MTN Petition at 4.

[110] MTN Petition at 4.

[111] *See* Intelsat Opposition at 23-24.

[112] FWCC Opposition at 3.

[113] FWCC Opposition at 3 & n.7 (citing 47 C.F.R. §§ 1.17, 1.52).

[114] MTN Reply at 3.

Commission, through ordinary complaint procedures, not in response to the Public Notice requirement in Section 25.221(a)(11). Accordingly, we decline to require FS operators to make any specific demonstrations.

44. Thus, when the FS operator informs the Commission that it has been omitted from the coordination, along with specifying the relevant frequencies that have been excluded, we expect the frequency coordinator to follow the necessary procedures to include that FS operator in the coordination agreement. After the FS operator has been included, the ESV operator may resume service (or commence service if it has not already) in the affected geographic location and specific frequencies, in accordance with the resulting coordination agreement.

45. Finally, we note that MTN also recommended that the Coordination Public Notice announcing that a particular coordination has been completed only specify the frequencies that have been coordinated for a particular port area by the frequency coordinator and not include the entire coordination agreement.[115] We dismiss MTN's request as moot because the International Bureau, following the filing of MTN's Petition, addressed this issue in a separate public notice.[116] In particular, the International Bureau stated that notification of the completed coordination must be submitted along with certain information regarding the coordination, such as the coordination method used. The International Bureau also stated that this information would be included in the Coordination Public Notice. Accordingly, ESV operators are not required to submit the entire coordination agreement.

3. ESV Spectrum Limits

46. In the *ESV Order*, the Commission allowed each ESV operator to coordinate the use of up to 72 megahertz of spectrum with the FS in the 5925-6425 MHz portion of the C-band under the condition that the ESV could coordinate using at most two satellites (*i.e.*, 36 megahertz uplink per satellite) in any geographic location.[117] Other co-primary FSS earth stations operating in bands with FS stations using that spectrum are permitted to coordinate on a full-band, full-arc basis.[118] Unlike standard FSS earth stations, which coordinate an antenna at a specific geographic location, the ESV operator must coordinate an area composed of the path through the waterway that the vessel will traverse, coming and going from the dock, and the dock at which the vessel will be moored.[119] To ensure the availability of spectrum for future FS, the Commission placed a limit on the amount of bandwidth that an individual ESV operator could coordinate for use with any single satellite, and, additionally, placed a limit on the maximum number of satellites the ESV operator could coordinate with the FS stations. This limit applies at a given geographical location, or point, within the area the ESV must coordinate. To further ensure that FS operators have access to additional spectrum in the band in the future, the Commission also limited ESV operators, collectively, to no more than 180 megahertz of spectrum per location within the

[115] *See* MTN Petition at 3-4.

[116] *See the International Bureau Provides Guidance Concerning the Notice Requirement for C-band Coordination by Earth Stations on Vessels*, Public Notice, DA 05-1671, 20 FCC Rcd 10748 (2005).

[117] *ESV Order*, 20 FCC Rcd at 691-692, ¶ 39.

[118] Full-band, full-arc is defined as the entire 1000 megahertz of C-band spectrum, 500 MHz of uplink and 500 MHz of downlink, with access to all visible GSO satellites.

[119] *See*, *e.g.*, ITU-R Rec. 1585 "Example approach for determination of the composite area within which interference to fixed service stations from earth stations on board vessels when operating in motion near a coastline would need to be evaluated."

coordinated area.[120] The Commission reasoned that these restrictions on ESV coordination were appropriate given the FWCC's concerns regarding the need for sufficient availability of spectrum for expansion of the FS in the band.[121] Since the FSS C-band uplink consists of 500 MHz of uplink transmit spectrum, the Commission reasoned that limiting a single ESV operator to 72 MHz, or less than 15 percent of transmit spectrum, and all ESV operators together to a maximum of 180 MHz, or 36% of the available C-band spectrum at any single point, would ensure sufficient unencumbered spectrum for the current and future FS systems.[122] Further, limiting each ESV to no more than two satellites significantly reduces the number of FS systems that are included in the coordination process for that ESV when compared with a standard FSS full-band, full-arc earth station.

47. The FWCC requests that Section 25.221(a)(10)[123] be rephrased so that an ESV operator can coordinate a maximum of 36 megahertz on each of two satellites but cannot encumber more than two 30-megahertz FS pairs at a given coordination location.[124] The FWCC contends that ESV spectrum limitations imposed in the *ESV Order* fail to take into account the encumbrance on FS frequency pairs.[125] According to the FWCC, these frequency pairs are set forth in the Commission's rules, are hard-wired into FS hardware and, therefore, cannot be arbitrarily changed.[126] The FWCC claims that when an ESV has coordinated a particular channel, it eliminates the use of the other channel of the pair by the FS.[127] The FWCC argues that the problem is further exacerbated because every FSS transponder channel straddles at least two FS 30-megahertz channels.[128] As a result, the FWCC contends 240 megahertz of spectrum is unusable by FS operators if just one ESV operator uses its allowable 36 megahertz in the C-band uplink.[129] When taking into account the FS pairings, the FWCC argues that the spectrum limits in Section 25.221 render much of the C-band spectrum unusable by the FS.

48. In addition, the FWCC claims that a similar problem exists with Section 25.202(a)(8), which allows ESVs to coordinate, collectively, 180 megahertz of spectrum at a particular location. The FWCC requests that the 180-megahertz aggregate rule be modified to contain the words "actually

[120] *ESV Order*, 20 FCC Rcd at 692, ¶ 40. The Commission stated that this aggregate limit consisted of two parts. "First, the total amount of spectrum coordinated by all ESVs at any point on a waterway is limited to 180 megahertz. Second, the aggregate amount of spectrum actually encumbered by ESV operations in an FS link path shall not exceed 180 megahertz." *ESV Order*, 20 FCC Rcd at 692, ¶ 40. *See also* 47 C.F.R. § 25.202(a)(8).

[121] *ESV Order*, 20 FCC Rcd at 692, ¶ 40.

[122] *ESV Order*, 20 FCC Rcd at 692, ¶ 41. We note that the FS C-band spectrum referred to here is the 500 megahertz from 5925-6425 MHz or the so-called "Lower 6 GHz Band," and does not include the 350 megahertz from 6525-6875 MHz or the so-called "Upper 6 GHz Band," which is not available to ESVs or Earth Stations in general. *See generally Amendment of Part 101 of the Commission's Rules to Accommodate 30 Megahertz Channels in the 6525-6875 MHz Band, et al.,* WT Docket No. 09-114, RM-11417, Notice of Proposed Rulemaking and Order, FCC 09-58 (rel. June 29, 2009).

[123] The Commission has re-designated Section 25.221(a)(10) as Section 25.221(a)(5). *See* Appendix B.

[124] FWCC Petition at 11-12.

[125] *See* FWCC Petition at 10-14.

[126] FWCC Petition at 11.

[127] FWCC Petition at 11.

[128] FWCC Petition at 12.

[129] FWCC Petition at 12.

encumbered" to emphasize that the rule takes into account both channels of an affected frequency pair.[130] According to the FWCC, if ESV operators are not required to count the paired channels when utilizing up to 180 megahertz, then they could tie up 360 megahertz of spectrum.[131] The FWCC recommends that the Commission modify the 180-megahertz aggregate limit to "reflect both sides of an affected frequency pair." Under this proposal, FWCC explains, for example, that ESV spectrum coordination that blocks only one side of an FS frequency pair and within the FS channel bandwidth would be considered 60 megahertz of encumbered spectrum whereas a "coordination that blocks one side of each of two different 30 MHz pairs" would be considered 120 megahertz of encumbered spectrum.[132]

49. MTN and Intelsat oppose the FWCC's proposal. MTN contends that the FWCC's proposal "ignores or dismisses the many operational conditions imposed on ESV operators designed to ensure that FS operators are protected from harmful interference."[133] Intelsat argues that ESV coordination will not prevent FS operators from using the spectrum.[134] Intelsat claims that the FWCC fails to consider that coordination takes into account the directionality of both the FS and ESV signals.[135] Intelsat explains that all coordinated ESV links will be directional since ESV operators can only coordinate uplinks with two satellites in a particular location.[136] The FWCC agrees with Intelsat that coordination takes the directionality of the ESV and FS antennas into account, but claims that this fact is irrelevant.[137] The FWCC contends that an ESV coordination zone spreads across a vast area, thereby creating the likelihood that a FS operator will have difficulty coordinating at least one end of a co-frequency FS link.[138] The FWCC concludes that, as a result, the expansion of existing FS systems as well as the implementation of new FS links will be impeded.[139]

50. *Discussion.* We decline to grant the FWCC's requests to require ESVs to encumber no more than two FS 30-megahertz channel pairs and, collectively, no more than three FS 30-megahertz channel pairs at a particular coordinated location.[140] We also decline to grant the FWCC's request that the Commission modify the language in the 180 megahertz rule to include the phrase "actually encumbered."[141] We conclude that the constraints we have placed on the ESV operators, both

[130] FWCC Petition at 13-14.

[131] FWCC Petition at 13.

[132] FWCC Petition at 14.

[133] MTN Opposition at 3.

[134] *See also* MTN Opposition at 2-3.

[135] Intelsat Opposition at 4.

[136] Intelsat Opposition at 4.

[137] FWCC Reply at 3.

[138] FWCC Reply at 3.

[139] FWCC Reply at 3.

[140] *See* FWCC Petition, Appendix at 1.

[141] *See* 47 C.F.R. § 25.202(a)(8).

individually and collectively,[142] strike the appropriate balance between the competing needs of the ESV and FS interests.

51. While the FWCC claims that a significant amount of spectrum will be encumbered, and therefore, rendered unusable for FS operators, even with the spectrum limits in place, we find that the impact on the FS usage depends on the characteristics of the ESV and FS systems operating at a particular coordinated location. For example, the area affected by the coordination of an ESV will depend, to a large extent, on the antenna gain of the FS receiver in the direction of the waterway. An FS receiver with an antenna pointed along the coast may be coordinated significantly closer to the waterway than an FS receiver with an antenna pointed directly towards the waterway. An FS receiver with an antenna pointed away from the waterway could be located still closer to the waterway and operate co-frequency with an ESV. Thus, the required coordination distance between a fixed receiver and an ESV will depend upon the gain of the fixed system in the direction of the waterway. In addition, although some of the FS stations utilize 30-megahertz channels, we note that a number of different frequency plans are available for FS operation with bandwidths ranging from 400 kilohertz to 30 megahertz. Because the interaction of the FS and ESV coordination will be determined by the specific parameters of both the FS and ESV systems, we find that any technical issues, such as potential encumbrances on FS channels, are best handled on a case-by-case basis by the frequency coordinator during the coordination. Also, we note that the satellite limits (*i.e.*, two satellites per coordinated location and no more than 36 megahertz per satellite) help to accommodate the FS operators since those limits reduce the geographic area that needs to be coordinated. Further, each coordination situation will depend upon the individual characteristics and location of the FS systems and the characteristics of the ESV and the area the ESV attempts to coordinate. Thus, the uniqueness of the coordination situation and the spectrum limits placed upon the ESVs help to ensure that the needs of the spectrum users are met.

4. Other Issues Raised by the FWCC

52. In the *ESV Order*, the Commission allowed ESVs to operate in the C-band and considered and implemented several measures to ensure that ESVs would protect the FS in the C-band.[143] These measures included: (1) prohibiting ESV operations in the C-band while traveling on U.S. inland waterways by requiring ESVs to operate in the Ku-band only or, alternatively, by adopting a minimum vessel size of 5,000 gross tons in the C-band; and (2) requiring ESV operators to coordinate only the spectrum they will actually use in the C-band.

53. In its petition, the FWCC renews its requests relating to these measures, as previously raised in prior to adoption of the *ESV Order*. The FWCC argues that "ESV operation on inland waterways raises special problems for the FS."[144] The FWCC proposes, as a solution, that the Commission require ESVs to operate in the Ku-band only, and not the C-band.[145] The FWCC contends that part of the Commission's rationale for allowing C-band use (*i.e.*, Ku-band coverage is not available on the open seas; dual band use of C- and Ku-band operation is expensive) does not apply to vessels on inland waterways and coastal routes.[146] The FWCC also disagrees with the Commission's rationale that

[142] In other words, at any given location, each ESV operator is limited to no more that 7.2 percent of the available transmit spectrum per satellite and no more than two satellites and, collectively, all ESV operators are limited to no more than 36 percent of the total uplink C-band spectrum.

[143] *See generally ESV Order.*

[144] FWCC Petition at 5.

[145] FWCC Petition at 6. *See also* FWCC Comments to the *ESV NPRM* at 9-10; FWCC Reply to the *ESV NPRM* at 23.

[146] FWCC Petition at 6.

"it would be inefficient from a spectrum management perspective not to let ESV operators coordinate use of the spectrum . . . ."[147] The FWCC claims that ESV coordination results in inefficient use of C-band spectrum because "[i]t blocks off large amounts of spectrum over wide geographic areas . . . ."[148] Further, the FWCC claims that, in the *ESV Order*, the Commission wrongly allows ESV use of the C-band to promote broadband competition and, instead, should prohibit such use in order to protect critical infrastructure and public safety communications.[149]

54. Alternatively, if the Commission continues to allow ESVs in the C-band, then the FWCC renews its request that the Commission limit the vessel size in the C-band to a minimum of 5,000 gross tons or larger.[150] The FWCC reasons that this requirement would ensure that ESVs would be limited to deep draft vessels operating in major waterways and claims that the Commission's reasons for adopting a 300 gross ton vessel size are "inadequate."[151]

55. Second, the FWCC reiterates its position that the C-band ESVs should be required to coordinate only the spectrum they will actually use.[152] Specifically, the FWCC contends that the Commission's reasoning for not requiring ESVs to coordinate only the spectrum they will actually use in the *ESV Order* includes "serious flaws." The FWCC claims that the spectrum limits imposed on ESVs, which the Commission used as a basis for declining to require an actual spectrum use demonstration, are "badly inadequate."[153] The FWCC also claims that the Commission mistakenly relied on the *FWCC Declaratory Ruling NPRM*, in which the Commission declined to require the FSS to demonstrate actual spectrum use, since "an ESV coordination necessarily blocks FS use over a much greater area than does a terrestrial earth station coordination."[154]

56. *Discussion.* We find that the FWCC has failed to find any Commission error or raise any new facts, which is required to justify review of these issues.[155] The Commission will review its decision with respect to the issues raised when the petitioner demonstrates that either a material error or omission has been made in the original order or the petitioner raises additional facts not known or existing until after the petitioners' last opportunity to respond.[156] The Commission also will reconsider issues if the

[147] FWCC Petition at 7 (citing *ESV Order*, 20 FCC Rcd at 700-701, ¶ 63).

[148] FWCC Petition at 7.

[149] FWCC Petition at 8.

[150] FWCC Petition at 8. *See also* FWCC Comments to the *ESV NPRM* at 13-14; FWCC Reply to the *ESV NPRM* at 22-23.

[151] FWCC Petition at 9.

[152] FWCC Petition at 10-11. *See also* FWCC Comments to the *ESV NPRM* at 13. Commenters oppose the FWCC's proposal. *See, e.g.*, Intelsat Opposition at 9-10 (opposing the FWCC's 5,000 gross ton proposal for vessels in the C-band). The FWCC claims that none of the arguments provided by the opposition effectively counters the FWCC's proposal for a 5,000 gross ton requirement. FWCC Reply at 6.

[153] FWCC Petition at 11.

[154] FWCC Petition at 11.

[155] *See* 47 C.F.R. § 1.429. Section 1.106 governs petitions for reconsideration of Commission decisions in non-rulemaking proceedings. *See* 47 C.F.R. § 1.106.

[156] *See Restrictions on Over-the-Air Reception Devices: Television Broadcast Service, Direct Broadcast Satellite, and Multichannel Multipoint Distribution Service*, CS Docket No. 96-83, Order on Reconsideration, FCC 99-360, 14 FCC Rcd 19924, 19927, ¶ 7, n.25 (1999).

Commission determines that such a review would serve the public interest.[157] As discussed further below, in the *ESV Order*, the Commission considered and rejected the FWCC's requests to: (1) prohibit ESV use of the C-band on inland waterways by barring C-band use or imposing a 5,000 gross ton vessel size for ESVs;[158] and (2) require ESVs to coordinate only the spectrum they will actually use in the C-band. Although the FWCC disagrees with the Commission's rationale, the FWCC has not identified any material error or omission in the *ESV Order*, and has not offered new facts or information that would warrant reconsideration of these issues. Nor are we convinced that reviewing these issues would serve the public interest.

57. We also decline to review the FWCC's renewed argument that the Commission should prohibit ESV use of the C-band on inland waterways by requiring ESVs to use the Ku-band "in U.S. waters."[159] The FWCC attempts to restate its position against ESVs in the C-band by claiming that two of the Commission's reasons for allowing C-band use (superior service of the C-band on the high seas and an ESV operator avoids the need to switch from the C-band to the Ku-band when entering inland waterways (*i.e.*, dual band approach)), "have no bearing on vessels that stay on inland and coastal routes where Ku-band coverage is available."[160] The FWCC also criticizes the Commission's reasoning that prohibiting C-band use may prevent access to ports accessible through inland waterways and claims that such ports could be served by the Ku-band. In the *ESV Order*, the Commission squarely addressed and rejected requiring Ku-band use within a certain distance from the U.S. coastline as a way of geographically limiting ESV C-band use, and now find that the FWCC has not presented any new facts or information to warrant reconsideration. In the *ESV Order*, it found that permitting ESV operations without geographic limitations in the C-band was appropriate so long as ESV operators complied with the technical requirements adopted to protect the FS.[161] Also, while acknowledging that there may be incentives for ESV operators to use the Ku-band in inland waterways, we found that if there is C-band spectrum available, the Commission determined that it would be inefficient use of spectrum not to allow ESV operators to coordinate and use that spectrum.[162] Moreover, the Commission also found that requiring ESV operators to use the Ku-band within a certain distance from the U.S. coastline would be technically complex, expensive, and an inefficient use of spectrum.[163] The FWCC also cites concerns over critical infrastructure and public safety communications as reasons to bar ESV use of the C-band in inland waterways. Again, the Commission specifically acknowledged in the *ESV Order* that C-band FS operations include public safety and critical infrastructure users and imposed technical restrictions on ESVs in the C-band to protect all types of incumbent operations in that band.[164] Nothing in the FWCC's

[157] As the Commission has stated previously, a "rehearing will not be granted merely for the purpose of debating matters on which the tribunal has once deliberated and spoken." *WWIZ, Inc.*, 37 FCC 685, 686, ¶ 2 (1965), *aff. Sub. Nom. Lorain Journal v. FCC*, 351 F.2d 824 (D.C. Cir. 1965).

[158] *ESV Order*, 20 FCC Rcd at 700, ¶ 61.

[159] The phrase that the FWCC uses in its petition is "ESVs should be restricted to Ku-band in U.S. waters." *See* FWCC Petition at 6. We interpret "in U.S. waters" to refer to all water surrounding the U.S., not just inland waterways. Thus, we interpret that phrase to mean that no ESVs would operate in the C-band when in U.S. waters.

[160] FWCC Petition at 6.

[161] *See ESV Order*, 20 FCC Rcd at 684-685, ¶ 19.

[162] *ESV Order*, 20 FCC Rcd at 700-701, ¶ 63.

[163] *See ESV Order*, 20 FCC Rcd at 684, ¶ 17. The dual band approach would require ESVs to switch from C-band to Ku-band when approaching inland waterways. *See id.*

[164] *See ESV Order*, 20 FCC Rcd at 684-685, ¶ 19.

petition persuades us to question the Commission's earlier decisions in the *ESV Order*. Thus, a review of this issue is not warranted.

58. We reject the FWCC's renewed claim that the Commission should adopt 5,000 gross tons as the minimum vessel size for C-band ESV operations. The FWCC continues to claim that limiting ESVs to vessels that are no less than 5,000 gross tons would essentially restrict ESVs to "deep draft vessels that operate in coastal waters or major waterways," thereby preventing ESVs on inland waterways.[165] In the *ESV Order*, the Commission acknowledged that vessels that are 300 gross tons or more could access inland waterways, but determined, as discussed above, that we would not impose geographic limitations on ESVs because they would be subject to the technical requirements designed to protect the FS in the C-band.[166] Thus, the Commission determined that 5,000 gross tons would not be necessary to protect the FS from harmful interference, particularly in light of the ESV technical requirements for the C-band.[167] In addition, prior to the adoption of the *ESV Order*, the FWCC stated that a 5,000 gross ton requirement would be less important if spectrum limits were imposed on ESVs, and, in the *ESV Order*, the Commission adopted spectrum limits of 72 megahertz for individual ESV operators and 180 megahertz for all ESV operators at a particular coordinated location.[168] We, therefore, find that we properly rejected the FWCC's proposal in the *ESV Order*.

59. Finally, we are not persuaded by the FWCC's renewed argument that ESVs should be required to coordinate only the spectrum they will actually use. We find that the Commission properly relied on spectrum limits as a basis for declining to require ESVs to coordinate only the spectrum they will actually use. As discussed in the spectrum limits section above, we are not persuaded by the FWCC's attempt to show that the spectrum limits on ESVs fail to adequately provide sufficient spectrum for the FS. The Commission also properly relied on the *FWCC Declaratory Ruling NPRM*, in which it declined to adopt a proposal by the FWCC to require FSS earth station applicants to demonstrate actual need for C-band spectrum.[169] We acknowledge that the mobile nature of ESVs requires a larger coordination zone than is required for FSS earth stations. However, the Commission distinguished ESVs and the FSS in the *ESV Order*. In particular, as noted by the Commission, the FS will receive more protection from the ESVs because, unlike the FSS, ESVs are subject to operational restrictions such as satellite and spectrum limits in the C-band uplink.[170] Accordingly, we decline to review this issue.

C. Non-U.S.-Registered Vessels Operating with Non-U.S. Hubs Near the U.S. Coastline

60. In the *ESV Order*, the Commission allowed C- and Ku-band ESVs on foreign-registered vessels to operate within 300 km of the U.S. coastline through hubs located outside of the United States under two conditions.[171] First, these ESVs could operate pursuant to the terms of an existing bilateral

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[165] FWCC Petition at 8-9. *See also* FWCC Comments to the ESV NPRM at 13-14.

[166] *ESV Order*, 20 FCC Rcd at 700-701, ¶ 63.

[167] *See ESV Order*, 20 FCC Rcd at 700-701, ¶¶ 61-63. *Accord* MTN Opposition at 3 (stating that there are sufficient measures, in addition to the spectrum limits, in place in the C-band that will prevent harmful interference to FS operations, including its critical infrastructure and public safety operations).

[168] *See ESV Order*, 20 FCC Rcd at 700, ¶ 61 (citing FWCC Dec. 8, 2004 *Ex Parte* Letter at 2).

[169] *See ESV Order*, 20 FCC Rcd at 694, ¶ 44 (citing *FWCC Request for Declaratory Ruling on Partial-Band Licensing of Earth Stations in the Fixed-Satellite Service That Share Terrestrial Spectrum*, IB Docket No. 00-203, Notice of Proposed Rulemaking, FCC 00-369, 15 FCC Rcd 23127, 23144-47, ¶¶ 38-42 (*FWCC Declaratory Ruling NPRM*)).

[170] *See ESV Order*, 20 FCC Rcd at 694, ¶ 44.

[171] *ESV Order*, 20 FCC Rcd at 726-727, ¶ 128.
(continued….)

agreement between the United States and the administration of the country in which the hub is located.[172] Second, these ESVs could operate pursuant to ITU RR 4.4[173] as long as the vessel's registering administration has permitted those operations under ITU RR 4.4. The Commission also determined that it would commence bilateral negotiations once it became aware of another administration authorizing ESV operations under ITU RR 4.4.[174]

61. In its petition, Boeing argues that the Commission should revise its 300 km restriction and instead adopt 125 km as the distance from the United States that Ku-band ESVs on foreign-registered vessels with non-U.S. hubs must operate pursuant to a bilateral agreement.[175] Boeing claims that the 300 km distance appears to be inconsistent with Resolution 902[176] and that Boeing can find no support in Resolution 902 or other international mandates for requiring a prior bilateral agreement for Ku-band ESVs beyond a distance of 125 km.[177] Boeing expresses concern that a 300-km distance for the Ku-band could adversely impact U.S.-licensed ESV operators around the globe by encouraging other administrations to adopt distances beyond the internationally-established minimum distance.[178] Intelsat supports Boeing's proposal, stating that the 125 km distance in the Ku-band is not only consistent with ITU Resolution 902, but also consistent with the U.S. support of the 125 km distance at WRC-03.[179]

62. Boeing also claims that the Commission may not require a prior agreement with foreign countries for ESV operations in the 14.0-14.4 GHz band since the U.S. is not a "concerned administration" under Resolution 902 in that band.[180] Boeing further argues that it can find no basis in Resolution 902 or International Radio Regulations that would warrant the Commission's decision in the

(Continued from previous page)

[172] *ESV Order*, 20 FCC Rcd at 726-727, ¶ 128.

[173] Under ITU RR 4.4, "[a]dministrations of the Member States shall not assign a station to any frequency in derogation of either the Table of Frequency Allocations in this Chapter or the other provisions of these Regulations, except on the express condition that such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and these Regulations."

[174] *ESV Order*, 20 FCC Rcd at 726-727, ¶ 128.

[175] Boeing Petition at 23.

[176] Resolution 902 provides that "[t]he minimum distances from the low-water mark as officially recognized by the coastal State beyond which ESVs can operate without the prior agreement of any administration are 300 km in the 5925-6425 MHz band and 125 km in the 14-14.5 GHz band, taking into account the technical limitations in Annex 2. Any transmissions from ESVs within the minimum distances shall be subject to the prior agreement of the concerned administration(s)." ITU-R Resolution 902 (WRC-03) Annex 1.

[177] Boeing Petition at 22.

[178] Boeing Petition at 23.

[179] *See* Intelsat Opposition at 22-23 (citing Document WRC03-0012, "United States of America, Proposals for the Work of the Conference," text related to Agenda Item 1.26).

[180] Boeing Petition at 24 (citing Resolution 902, Annex 1). Boeing states that the *ESV Order* describes the United States as a concerned administration in the 14.0-14.5 GHz band. *Id.* at 23 (citing *ESV Order*, 20 FCC Rcd at 726, ¶ 128, n.330). Boeing also states that the International Radio Regulations designate the United States as a concerned administration only with regard to the 14.4-14.5 GHz band. *Id.* at 24, n.45. We acknowledge that the *ESV Order* includes a typographical error. Therefore, as Boeing points out, the United States is a concerned administration in the 14.4-14.5 GHz band under Resolution 902 and not the 14.0-14.4 GHz band.

ESV Order to require a prior agreement for foreign-registered ESVs with non-U.S. hubs operating in the 14.0-14.4 GHz band.[181] No commenters responded to Boeing's requests.

63. *Discussion.* On reconsideration, we adopt Boeing's proposal to reduce the distance from 300 km to 125 km for Ku-band ESVs on foreign-registered vessels that operate with non-U.S. hubs pursuant to a bilateral agreement or ITU 4.4. As Boeing discusses, 125 km is the internationally established distance adopted in Resolution 902 for ESV operations in the Ku-band.[182] Also, we agree with Boeing that maintaining the 300 km distance may encourage other countries to adopt distances that extend beyond the internationally established minimum distance of 125 km.[183] In addition, a distance of 300 km is unnecessary for the Ku-band. Unlike the C-band, the ESV operators in the Ku-band do not transmit in spectrum that is shared with FS operators, including off-shore FS operators.[184] Also, we note that Intelsat supports the 125 km distance and no commenters filed oppositions to changing the distance to 125 km. Accordingly, we require foreign-registered vessels using non-U.S. hubs to comply with a bilateral agreement or ITU 4.4 when operating within 125 km of the U.S. coastline.

64. In addition, despite Boeing's claims to the contrary, in the *ESV Order* the Commission did not require a prior agreement for ESVs on foreign-registered vessels with non-U.S. hubs operating near the U.S. coastline. The *ESV Order* gave these ESV operators a choice between either operating: (1) pursuant to an existing bilateral agreement; or (2) pursuant to ITU RR 4.4.[185] A prior agreement is an option, not a requirement. If no prior agreement exists, the ESV operator may operate pursuant to ITU RR 4.4 when traveling within 125 km of the U.S. coastline in the Ku-band, provided that the vessel's registering administration has authorized such operations under ITU RR 4.4.[186] Therefore, we decline to determine whether the Commission has the authority under Resolution 902 to require a prior agreement in the 14.0-14.4 GHz band.

D. Procedural Rule Revisions

65. The following rule changes are procedural, and therefore, not subject to the notice and comment requirements of the Administrative Procedure Act.[187] We adopt these procedural changes in

[181] *See* Boeing Petition at 23-24.

[182] In addition, as Intelsat points out, the United States supported the 125 km distance for the Ku-band at WRC-03. *See* Intelsat Opposition at 22-23 (citing Document WRC03-C-0012, "United States of America, Proposals for the Work of the Conference," Agenda Item 1.26).

[183] Boeing Petition at 23.

[184] We note that ESVs can receive in the extended Ku-band (10.95-11.2 GHz and 11.45-11.7 GHz), which is shared with the FS. However ESVs that use the extended Ku-band are not afforded protection and must accept interference from current and future FS operations.

[185] *ESV Order*, 20 FCC Rcd at 726-727, ¶ 128.

[186] In addition, Boeing also claims that, if the Commission decides to pursue bilateral agreements with countries where foreign ESV operators obtain approval under ITU RR 4.4, as indicated in the *ESV Order*, then the Commission should negotiate with the foreign administration that registered the foreign vessel and not the country where the hub is located. *See* Boeing Petition at 22, n.41. We agree with Boeing that, if the foreign ESV operator leases its hub, the foreign administration where the hub is located may not be aware of the ESV operator. *See id.* Since the *ESV Order* does not indicate which foreign administration would be contacted, we clarify that we will negotiate bilateral agreements with the foreign country where the foreign vessel is registered.

[187] *See* 5 U.S.C. § 553(b)(3)(A) (2007). All rule changes described in this section are "interpretative rules, general statements of policy, or rules of agency organization, procedure, or practice." *Id.* The rules changes are set forth in Appendix B.

order to clarify the rules and to facilitate the ESV application process.

- We separate the ESV operational requirements from the ESV application requirements, which are intermingled in the current version of the rules, in order to simplify the organization of the ESV rules.

- We modify Sections 25.221(a)(1)(i) and 25.222(a)(1)(i), the provisions that provide for the off-axis e.i.r.p. spectral-density limits. In particular, to be consistent with the Commission's decision in the *Part 25 Streamlining 8th R&O* to modify the off-axis e.i.r.p. spectral-density envelope for non-ESV earth stations, we modify the off-axis e.i.r.p. spectral-density envelope by changing the definition of theta for ESVs to be the angle in degrees from the line connecting the focal point of the antenna to the target satellite.

- We modify Sections 25.221(a)(1)(i) and 25.222(a)(1)(i), the provisions that provide for the off-axis e.i.r.p. spectral-density limits, to more fully reflect the antenna patterns contained in Section 25.209 that these e.i.r.p. spectral-density limits are based upon.

- We modify Sections 25.221(b)(1)(i) and 25.222(b)(1)(i), the provisions that require certain demonstrations for how an ESV applicant will meet the off-axis e.i.r.p. spectral-density limits. In particular, we change the format of the tables that applicants submit so that the tables are based around the line from the earth station to the target satellite, instead of basing the tables around the antenna boresight or main beam. This change conforms the application to the change of the definition of theta in Sections 25.221(a)(1)(i) and 25.222(a)(1)(i).

- To facilitate the application process, we require ESV applicants to file a certification regarding the antenna tracking system with the ESV application, in lieu of the current practice of Commission staff requesting the certification from the applicant after the application is filed. As a result, we add paragraph (b)(1)(iii) to Sections 25.221 and 25.222 requesting that ESV applicant file a certification from the equipment manufacturer stating that its antenna tracking system will meet the 0.2 degree antenna pointing requirement and will cease emissions within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds 0.5 degrees.

- We add paragraph (b)(4) to Sections 25.221 and 25.222 to require ESV applicants to include, in the ESV application, their point of contact information and, if relevant, the point of contact information as provided for in Sections 25.221(a)(7) and 25.222(a)(7). Sections 25.221(a)(3) and 25.222(a)(3) require an ESV operator to have a point of contact in the United States. Under the ESV rules, as revised, Sections 25.221(a)(7) and 25.222(a)(7) require ESVs that communicate with vessels of foreign registry to retain a point of contact for the relevant administration responsible for licensing ESVs.

- We modify Section 25.271, the rule concerning operation and maintenance of a transmitting earth station,[188] to include ESVs in order to ensure that ESVs that operate by remote control follow the applicable rules and procedures for remote control terminals. We note that systems that operate by remote control must comply with certain requirements in Section 25.271 and must complete items E61 through E66 in Schedule B of FCC Form 312. We recognize that most ESV terminals operate remotely, but we have not explicitly used the term "remote control" in the

[188] *See* 47 C.F.R. § 25.271.

ESV rules. Consequently, applicants of ESV systems that operate by remote control have been filing attachments to their application, but not checking the box on Form 312 referencing remote control operations.

- We modify Section 25.132(b)(3) by adding a specific reference to the procedures set out in Sections 25.221 and 25.222. We note that this clarifies the requirement that applicants seeking authority to use an antenna that does not meet the standards set forth in Section 25.209(a) and (b), pursuant to the procedures set forth in Sections 25.221 and 25.222, are required to submit a copy of the manufacturer's range test plots of the antenna gain patterns specified in Section 25.132(b)(1).

- We clarify the antenna pointing error requirement in Sections 25.221(a)(1)(ii)(A), (iii)(A) and 25.222(a)(1)(ii)(A), (iii)(A) by changing the language from "less than 0.2°" to "less than or equal to 0.2°." We modify these rules in order to be consistent with the *ESV Order*, where the Commission required "C-band ESV operators to maintain a peak tracking error of 0.2 degrees for all antennas within their licensed networks."[189] The clarification to the ESV rules applies to both C- and Ku-band operators that operate pursuant to these provisions.

IV. CONCLUSION

66. In this Order on Reconsideration, we modify certain ESV rules for protecting FSS operations to provide operational flexibility to ESV providers while ensuring that the FSS operators are protected from harmful interference in the C- and Ku-bands. In addition, in the C-band, we clarify the ESV requirement to protect offshore FS and clarify the Public Notice requirement related to the completion of ESV coordination with the FS at a particular location. Further, we decline to review some of the FWCC's issues raised in its petition because the FWCC fails to raise new facts or identify any material errors or omissions in the *ESV Order*. To further ensure flexibility in the Ku-band, we shorten the distance from the U.S. coastline that triggers compliance with a bilateral agreement or ITU RR 4.4 by ESVs on foreign-registered vessels that operate with non-U.S. hubs.

V. PROCEDURAL MATTERS

A. Final Regulatory Flexibility Certification

67. The Regulatory Flexibility Act of 1980, as amended (RFA),[190] requires that a regulatory flexibility analysis be prepared for notice-and-comment rule making proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[191] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[192] In addition, the term "small business" has the same meaning as the term "small business concern" under

[189] *ESV Order*, 20 FCC Rcd at 699, ¶ 58. We note that, with respect to Ku-band operators, the Commission had stated that "Ku-band ESV operators maintain a pointing accuracy of no less than 0.2 degrees for all antennas within their licensed network." *See ESV Order*, 20 FCC Rcd at 718, ¶ 103. We reiterate, however, that the clarification to Sections 25.221(a)(1)(ii)(A), (iii)(A) and 25.222(a)(1)(ii)(A), (iii)(A) applies to both the C- and Ku-band ESVs operating pursuant to the 0.2 degree antenna pointing error requirement.

[190] The RFA, *see* 5 U.S.C. §§ 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[191] 5 U.S.C. § 605(b).

[192] 5 U.S.C. § 601(6).

the Small Business Act.[193] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the U.S. Small Business Administration (SBA).[194]

68. In light of the rules adopted in the *ESV Order,* we find that there are only two categories of licensees that would be affected by the new rules. These categories of licensees are Satellite Telecommunications and Fixed-Satellite Transmit/Receive Earth Stations. The SBA has determined that the small business size standard for Satellite Telecommunications is a business that has $15 million or less in average annual receipts.[195] Currently there are approximately 3,390 operational fixed-satellite transmit/received earth stations authorized for use in the C- and Ku-bands. The Commission does not request or collect annual revenue information, and thus is unable to estimate the number of earth stations that would constitute a small business under the SBA definition. Of the two classifications of licensees, we estimate that only 15 entities will provide ESV service. For the reasons described below, we certify that the policies and rules adopted in this *Order on Reconsideration* will not have a significant economic impact on a substantial number of small entities.

69. In the *ESV Order*, the Commission established licensing and service rules for ESVs operating in the 5925-6425 MHz/3700-4200 MHz (C-band) and 14.0-14.5 GHz/11.7-12.2 GHz (Ku-band) frequencies. These rules allow ESV operations in the C- and Ku-bands, while ensuring that ESVs protect the fixed service (FS) and fixed-satellite service (FSS) operators, and a limited number of Government operations in these bands from harmful interference.

70. In this *Order on Reconsideration*, the Commission clarifies and modifies certain ESV rules designed to protect the FSS and the FS in the C- and Ku-bands. In particular, we modify our rules to protect the FSS by allowing greater operational flexibility for ESVs. For example, ESVs may operate at higher off-axis power-density levels as long as the ESV remains within the parameters of the coordination agreements between the target satellite and adjacent satellites. With regard to protecting the FS in the C-band, we clarify the ESV requirement to protect offshore FS and clarify and modify the requirement for an ESV to cease emissions if an FS at a particular location has been excluded from the coordination with the ESV. Finally, to further promote flexibility in the Ku-band, we shorten the distance from the U.S. coastline within which foreign-registered vessels that operate with non-U.S. hubs must comply with a bilateral agreement or ITU RR 4.4.

71. The Commission does not expect small entities to incur significant costs associated with the changes adopted in this *Order on Reconsideration*. The changes will benefit both large and small entities by allowing greater operational flexibility in providing ESV service. We believe these requirements are nominal and do not impose a significant economic impact on small entities. Therefore, we certify that the requirements adopted in this *Report and Order* will not have a significant economic impact on a substantial number of small entities.

[193] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[194] 15 U.S.C. § 632.

[195] 13 C.F.R. § 121.201, NAICS codes 517410 and 517910.

B. Final Paperwork Reduction Act of 1995 Analysis

72. This *Order on Reconsideration* contains new information collections subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under Section 3507(d) of the PRA. OMB, the general public, and other Federal agencies are invited to comment on the modified information collection contained in this proceeding.

73. All comments regarding the requests for approval of the information collection should be submitted to Judith B. Herman, Federal Communications Commission, Room 1-C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to Judith-B.Herman@fcc.gov, phone 202-418-0214.

VI. ORDERING CLAUSES

74. IT IS ORDERED that, pursuant to Sections 4(i), 7, 302, 303(c), 303(e), 303(f) and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 157, 302, 303(c), 303(e), 303(f) and 303(r), this Order on Reconsideration IS ADOPTED. Part 25 of the Commission's Rules IS AMENDED, as specified in Appendix B, effective 30 days after publication in the Federal Register.

75. IT IS FURTHER ORDERED that the Petition for Reconsideration filed by ARINC Incorporated IS GRANTED in part to the extent described above and IS DENIED in all other respects.

76. IT IS FURTHER ORDERED that the Petition for Reconsideration filed by The Boeing Company IS GRANTED in part to the extent described above and IS DENIED in all other respects.

77. IT IS FURTHER ORDERED that the Petition for Reconsideration filed by the Fixed Wireless Communications Coalition IS DENIED in part to the extent described above and IS DISMISSED in all other respects.

78. IT IS FURTHER ORDERED that the Petition for Reconsideration filed by the Maritime Telecommunications Network IS GRANTED in part to the extent described above and IS DENIED in all other respects.

79. IT IS FURTHER ORDERED that the Final Regulatory Flexibility Certification, as required by Section 604 of the Regulatory Flexibility Act, IS ADOPTED.

80. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Order on Reconsideration including the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

List of Parties

List of Petitioners
ARINC Incorporated (ARINC)
The Boeing Company (Boeing)
Fixed Wireless Communications Coalition (FWCC)
Maritime Telecommunications Network, Inc. (MTN)

List of Opposition
ARINC
Boeing
FWCC
Intelsat Limited (Intelsat)
MTN

List of Replies
Boeing
FWCC
Intelsat
MTN

Ex Parte Filings
Boeing
Intelsat

APPENDIX B

Rule Revisions

For the reasons discussed above, the Federal Communications Commission amends 47 C.F.R. part 25 as follows:

PART 25 – SATELLITE COMMUNICATIONS

1. The authority citation for Part 25 continues to read as follows:

Authority: 47 U.S.C. 701-744. Interprets or applies Sections 4, 301, 302,303, 307, 309 and 332 of the Communications Act, as amended, 47 U.S.C. Sections 154, 301, 302, 303, 307, 309, 332, unless otherwise noted.

2. Section 25.132 is amended by revising paragraph (b)(3) as follows:

§ 25.132 Verification of earth station antenna performance standards.

* * *

(b)(3) Applicants seeking authority to use an antenna that does not meet the standards set forth in §§ 25.209(a) and (b) of this part, pursuant to the procedure set forth in § 25.220, § 25.221, § 25.222, or § 25.223(c) of this part, are required to submit a copy of the manufacturer's range test plots of the antenna gain patterns specified in paragraph (b)(1) of this section.

* * *

3. Section 25.221 is amended in its entirety to read as follows:

§ 25.221 Blanket Licensing provisions for Earth Stations on Vessels (ESVs) receiving in the 3700–4200 MHz (space-to-Earth) frequency band and transmitting in the 5925–6425 MHz (Earth-to-space) frequency band, operating with Geostationary Satellite Orbit (GSO) Satellites in the Fixed-Satellite Service.

(a) The following ongoing requirements govern all ESV licensees and operations in the 3700-4200 MHz (space-to-Earth) and 5925–6425 MHz (Earth-to-space) bands transmitting to GSO satellites in the fixed-satellite service. ESV licensees must comply with the requirements in either paragraph (a)(1) or (a)(2) of this section and all of the requirements set forth in paragraphs (a)(3)-(a)(12) of this section. Paragraph (b) of this section identifies items that must be included in the application for ESV operations to demonstrate that these ongoing requirements will be met.

(1) The following requirements shall apply to an ESV that uses transmitters with off-axis EIRP spectral-densities lower than or equal to the levels in paragraph (a)(1)(i) of this subsection. An ESV, or ESV system, operating under this subsection shall provide a detailed demonstration as described in paragraph (b)(1) of this section. The ESV transmitter must also comply with the antenna pointing and cessation of emission requirements in paragraphs (a)(1)(ii) and (a)(1)(iii) of this subsection.

(i) An ESV system shall not exceed the off-axis EIRP spectral-density limits and conditions defined in paragraphs (A)-(D) of this subsection.

(A) The off-axis EIRP spectral-density emitted from the ESV, in the plane of the GSO as it appears at the particular earth station location, shall not exceed the following values:

26.3 - 10log(N) - 25logθ	dBW/4 kHz	for	1.5° ≤ θ ≤ 7°
5.3 -10log(N)	dBW/4 kHz	for	7° < θ ≤ 9.2°
29.3 -10log(N) - 25logθ	dBW/4 kHz	for	9.2° < θ ≤ 48°
-12.7 -10log(N)	dBW/4 kHz	for	48° < θ ≤ 180°

where theta (θ) is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, the plane of the GSO is determined by the focal point of the antenna and the line tangent to the arc of the GSO at the orbital location of the target satellite. For an ESV network using frequency division multiple access (FDMA) or time division multiple access (TDMA) techniques, N is equal to one. For ESV networks using multiple co-frequency transmitters that have the same EIRP, N is the maximum expected number of co-frequency simultaneously transmitting ESV earth stations in the same satellite receiving beam. For the purpose of this section, the peak EIRP of an individual sidelobe may not exceed the envelope defined above for θ between 1.5° and 7.0°. For θ greater than 7.0°, the envelope may be exceeded by no more than 10% of the sidelobes, provided no individual sidelobe exceeds the envelope given above by more than 3 dB.

(B) In all directions other than along the GSO, the off-axis EIRP spectral-density for co-polarized signals emitted from the ESV shall not exceed the following values:

29.3 - 10log(N) - 25logθ	dBW/4 kHz	for	3.0° ≤ θ ≤ 48°
-12.7 - 10log(N)	dBW/4 kHz	for	48° < θ ≤ 180°

where θ and N are defined in paragraph (a)(1)(i)(A). This off-axis EIRP spectral-density applies in any plane that includes the line connecting the focal point of the antenna to the orbital location of the target satellite with the exception of the plane of the GSO as defined in paragraph (a)(1)(i)(A) of this section. For the purpose of this subsection, the envelope may be exceeded by no more than 10% of the sidelobes provided no individual sidelobe exceeds the gain envelope given above by more than 6 dB. The region of the main reflector spillover energy is to be interpreted as a single lobe and shall not exceed the envelope by more than 6 dB.

(C) In all directions, the off-axis EIRP spectral-density for cross-polarized signals emitted from the ESV shall not exceed the following values:

16.3 - 10log(N) - 25logθ	dBW/4 kHz	for	1.8° ≤ θ ≤ 7.0°
-4.7 - 10log(N)	dBW/4 kHz	for	7.0° < θ ≤ 9.2°

where θ and N are defined as set forth in paragraph (a)(1)(i)(A) of this section. This EIRP spectral-density applies in any plane that includes the line connecting the focal point of the antenna to the orbital location of the target satellite.

(D) For non-circular ESV antennas, the major axis of the antenna will be aligned with the tangent to the arc of the GSO at the orbital location of the target

satellite, to the extent required to meet the specified off-axis EIRP spectral-density criteria.

(ii) Each ESV transmitter must meet one of the following antenna pointing requirements:

(A) Each ESV transmitter shall maintain a pointing error of less than or equal to 0.2° between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna, or

(B) Each ESV transmitter shall declare a maximum antenna pointing error that may be greater than 0.2° provided that the ESV does not exceed the off-axis EIRP spectral-density limits in paragraph (a)(1)(i) of this section, taking into account the antenna pointing error.

(iii) Each ESV transmitter must meet one of the following cessation of emission requirements:

(A) For ESVs operating under paragraph (a)(1)(ii)(A) of this section, all emissions from the ESV shall automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds 0.5°, and transmission will not resume until such angle is less than or equal to 0.2°, or

(B) For ESV transmitters operating under paragraph (a)(1)(ii)(B) of this section, all emissions from the ESV shall automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds the declared maximum antenna pointing error and shall not resume transmissions until such angle is less than or equal to the declared maximum antenna pointing error.

(2) The following requirements shall apply to an ESV that uses off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(1)(i) of this section. An ESV, or ESV system, operating under this subsection shall file certifications and provide a detailed demonstration as described in paragraph (b)(2) of this section.

(i) The ESV shall transmit only to the target satellite system(s) referred to in the certifications required by paragraph (b)(2) of this section.

(ii) If a good faith agreement cannot be reached between the target satellite operator and the operator of a future satellite that is located within 6 degrees longitude of the target satellite, the ESV operator shall accept the power-density levels that would accommodate that adjacent satellite.

(iii) The ESV shall operate in accordance with the off-axis EIRP spectral-densities that the ESV supplied to the target satellite operator in order to obtain the certifications listed in paragraph (b)(2) of this section. The ESV shall automatically cease emissions within 100 milliseconds if the ESV transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator.

(3) There shall be a point of contact in the United States, with phone number and address, available 24 hours a day, seven days a week, with authority and ability to cease all emissions

from the ESVs, either directly or through the facilities of a U.S. Hub or a Hub located in another country with which the United States has a bilateral agreement that enables such cessation of emissions.

(4) For each ESV transmitter, a record of the ship location (*i.e.,* latitude/longitude), transmit frequency, channel bandwidth and satellite used shall be time annotated and maintained for a period of not less than 1 year. Records will be recorded at time intervals no greater than every 20 minutes while the ESV is transmitting. The ESV operator will make this data available upon request to a coordinator, fixed system operator, fixed-satellite system operator, or the Commission within 24 hours of the request.

(5) ESV operators communicating with vessels of foreign registry must maintain detailed information on each vessel's country of registry and a point of contact for the relevant administration responsible for licensing ESVs.

(6) ESV operators shall control all ESVs by a Hub earth station located in the United States, except that an ESV on U.S.-registered vessels may operate under control of a Hub earth station location outside the United States provided the ESV operator maintains a point of contact within the United States that will have the capability and authority to cause an ESV on a U.S.-registered vessel to cease transmitting if necessary.

(7) ESV operators transmitting in the 5925–6425 MHz (Earth-to-space) frequency bands to GSO satellites in the fixed-satellite service (FSS) shall not seek to coordinate, in any geographic location, more than 36 MHz of uplink bandwidth on each of no more than two GSO FSS satellites.

(8) ESVs shall not operate in the 5925–6425 MHz (Earth-to-space) and 3700–4200 MHz (space-to-Earth) frequency bands on vessels smaller than 300 gross tons.

(9) ESVs, operating while docked, that complete coordination with terrestrial stations in the 3700–4200 MHz band in accordance with §25.251, shall receive protection from such terrestrial stations in accordance with the coordination agreements, for 180 days, renewable for 180 days.

(10) ESVs in motion shall not claim protection from harmful interference from any authorized terrestrial stations or lawfully operating satellites to which frequencies are either already assigned, or may be assigned in the future in the 3700–4200 MHz (space-to-Earth) frequency band.

(11) ESVs operating within 200 km from the baseline of the United States, or within 200 km from a U.S.-licensed fixed service offshore installation, shall complete coordination with potentially affected U.S.-licensed fixed service operators prior to operation. The coordination method and the interference criteria objective shall be determined by the frequency coordinator. The details of the coordination shall be maintained and available at the frequency coordinator, and shall be filed with the Commission to be placed on Public Notice. Operation of each individual ESV may commence immediately after the Public Notice is released that identifies the notification sent to the Commission. Continuance of operation of that ESV for the duration of the coordination term shall be dependent upon successful completion of the normal public notice process. If, prior to the end of the 30-day comment period of the Public Notice, any objections are received from U.S.-licensed fixed service operators that have been excluded from coordination, the ESV licensee shall immediately cease operation of that particular station on

frequencies used by the affected U.S.-licensed fixed service station until the coordination dispute is resolved and the ESV licensee informs the Commission of the resolution.

(12) ESV operators must automatically cease transmission if the ESV operates in violation of the terms of its coordination agreement, including, but not limited to, conditions related to speed of the vessel or if the ESV travels outside the coordinated area, if within 200 km from the baseline of the United States, or within 200 km from a U.S.-licensed fixed service offshore installation. Transmissions may be controlled by the ESV network. The frequency coordinator may decide whether ESV operators should automatically cease transmissions if the vessel falls below a prescribed speed within a prescribed geographic area.

(b) Applications for ESV operation in the 5925–6425 MHz (Earth-to-space) band to GSO satellites in the fixed-satellite service must include, in addition to the particulars of operation identified on Form 312, and associated Schedule B, the applicable technical demonstrations in paragraphs (b)(1) or (b)(2) and the documentation identified in paragraphs (b)(3) through (b)(5) of this section.

(1) An ESV applicant proposing to implement a transmitter under paragraph (a)(1) of this section must demonstrate that the transmitter meets the off-axis EIRP spectral-density limits contained in paragraph (a)(1)(i) of this section. To provide this demonstration, the application shall include the tables described in paragraph (b)(1)(i) of this section or the certification described in paragraph (b)(1)(ii) of this section. The ESV applicant also must provide the value N described in paragraph (a)(1)(i)(A) of this section. An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section must provide the certifications identified in paragraph (b)(1)(iii) of this section. An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section must provide the demonstrations identified in paragraph (b)(1)(iv) of this section.

(i) Any ESV applicant filing an application pursuant to paragraph (a)(1) of this section must file three tables showing the off-axis EIRP level of the proposed earth station antenna in the direction of the plane of the GSO; the co-polarized EIRP in the elevation plane, that is, the plane perpendicular to the plane of the GSO; and cross polarized EIRP. In each table, the EIRP level must be provided at increments of 0.1° for angles between 0° and 10° off-axis, and at increments of 5° for angles between 10° and 180° off-axis.

(A) For purposes of the off-axis EIRP table in the plane of the GSO, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital position of the target satellite, and the plane of the GSO is determined by the focal point of the antenna and the line tangent to the arc of the GSO at the orbital position of the target satellite.

(B) For purposes of the off-axis co-polarized EIRP table in the elevation plane, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital position of the target satellite, and the elevation plane is defined as the plane perpendicular to the plane of the GSO defined in paragraph (b)(1)(i)(A) of this section.

(C) For purposes of the cross-polarized EIRP table, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital position of the target satellite and the plane of the GSO as defined in paragraph (b)(1)(i)(A) of this section will be used.

(ii) A certification, in Schedule B, that the ESV antenna conforms to the gain pattern criteria of § 25.209(a) and (b), that, combined with the maximum input power density calculated from the EIRP density less the antenna gain, which is entered in Schedule B, demonstrates that the off-axis EIRP spectral density envelope set forth in paragraphs (a)(1)(i)(A) through (a)(1)(i)(C) of this section will be met under the assumption that the antenna is pointed at the target satellite.

(iii) An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section, must provide a certification from the equipment manufacturer stating that the antenna tracking system will maintain a pointing error of less than or equal to 0.2º between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna and that the antenna tracking system is capable of ceasing emissions within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds 0.5°.

(iv) An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section must:

(A) declare, in its application, a maximum antenna pointing error and demonstrate that the maximum antenna pointing error can be achieved without exceeding the off-axis EIRP spectral-density limits in paragraph (a)(1)(i) of this section; and

(B) demonstrate that the ESV transmitter can detect if the transmitter exceeds the declared maximum antenna pointing error and can cease transmission within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds the declared maximum antenna pointing error, and will not resume transmissions until the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna is less than or equal to the declared maximum antenna pointing error.

(2) An ESV applicant proposing to implement a transmitter under paragraph (a)(2) of this section and using off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(1)(i) of this section shall provide the following certifications and demonstration as exhibits to its earth station application:

(i) A statement from the target satellite operator certifying that the proposed operation of the ESV has the potential to create harmful interference to satellite networks adjacent to the target satellite(s) that may be unacceptable.

(ii) A statement from the target satellite operator certifying that the power-density levels that the ESV applicant provided to the target satellite operator are consistent with the existing coordination agreements between its satellite(s) and the adjacent satellite systems within 6° of orbital separation from its satellite(s).

(iii) A statement from the target satellite operator certifying that it will include the power-density levels of the ESV applicant in all future coordination agreements.

(iv) A demonstration from the ESV operator that the ESV system is capable of detecting and automatically ceasing emissions within 100 milliseconds when the transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator.

(v) A certification from the ESV operator that the ESV system complies with the power limits in Section 25.204(h).

(3) There shall be an exhibit included with the application describing the geographic area(s) in which the ESVs will operate.

(4) The point of contact information referred to in paragraph (a)(3) and, if applicable, paragraph (a)(6) of this section, must be included in the application.

(5) ESVs that exceed the radiation guidelines of Section 1.1310 Radiofrequency radiation exposure limits must provide, with their environmental assessment, a plan for mitigation of radiation exposure to the extent required to meet those guidelines.

4. Section 25.222 is amended in its entirety to read as follows:

§ 25.222 Blanket Licensing provisions for Earth Stations on Vessels (ESVs) receiving in the 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) frequency bands and transmitting in the 14.0-14.5 GHz (Earth-to-space) frequency band, operating with Geostationary Orbit (GSO) Satellites in the Fixed-Satellite Service.

(a) The following ongoing requirements govern all ESV licensees and operations in the 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) frequency bands and 14.0-14.5 GHz (Earth-to-space) bands transmitting to GSO satellites in the fixed-satellite service. ESV licensees must comply with the requirements in either paragraph (a)(1) or (a)(2) of this section and all of the requirements set forth in paragraphs (a)(3)-(a)(7) of this section. Paragraph (b) of this section identifies items that must be included in the application for ESV operations to demonstrate that these ongoing requirements will be met.

(1) The following requirements shall apply to an ESV that uses transmitters with off-axis EIRP spectral-densities lower than or equal to the levels in paragraph (A) of this subsection. An ESV, or ESV system, operating under this subsection shall provide a detailed demonstration as described in paragraph (b)(1) of this section. The ESV transmitter also must comply with the antenna pointing and cessation of emission requirements in paragraphs (a)(1)(ii) and (a)(1)(iii) of this subsection.

(i) An ESV system shall not exceed the off-axis EIRP spectral-density limits and conditions defined in paragraphs (A)-(D) of this subsection.

(A) The off-axis EIRP spectral-density emitted from the ESV, in the plane of the GSO as it appears at the particular earth station location, shall not exceed the following values:

15 - 10log(N) - 25logθ	dBW/4 kHz	for	$1.5° \leq \theta \leq 7°$
-6 -10log(N)	dBW/4 kHz	for	$7° < \theta \leq 9.2°$
18 -10log(N) - 25logθ	dBW/4 kHz	for	$9.2° < \theta \leq 48°$
-24 -10log(N)	dBW/4 kHz	for	$48° < \theta \leq 85°$
-14 -10log(N)	dBW/4 kHz	for	$85° < \theta \leq 180°$

where theta (θ) is the angle in degrees from the line connecting the focal point of

the antenna to the orbital location of the target satellite, the plane of the GSO is determined by the focal point of the antenna and the line tangent to the arc of the GSO at the orbital location of the target satellite. For ESV networks using frequency division multiple access (FDMA) or time division multiple access (TDMA) techniques, N is equal to one. For ESV networks using multiple co-frequency transmitters that have the same EIRP, N is the maximum expected number of co-frequency simultaneously transmitting ESV earth stations in the same satellite receiving beam. For the purpose of this subsection, the peak EIRP of an individual sidelobe may not exceed the envelope defined above for θ between 1.5° and 7.0°. For θ greater than 7.0°, the envelope may be exceeded by no more than 10% of the sidelobes, provided no individual sidelobe exceeds the envelope given above by more than 3 dB.

(B) In all directions other than along the GSO, the off-axis EIRP spectral-density for co-polarized signals emitted from the ESV shall not exceed the following values:

18 - 10log(N) - 25logθ	dBW/4 kHz	for	$3.0° \leq \theta \leq 48°$
-24 - 10log(N)	dBW/4 kHz	for	$48° < \theta \leq 85°$
-14 - 10log(N)	dBW/4 kHz	for	$85° < \theta \leq 180°$

where θ and N are defined in paragraph (a)(1)(i)(A). This off-axis EIRP spectral-density applies in any plane that includes the line connecting the focal point of the antenna to the orbital location of the target satellite with the exception of the plane of the GSO as defined in paragraph (a)(1)(i)(A) of this section. For the purpose of this subsection, the envelope may be exceeded by no more than 10% of the sidelobes provided no individual sidelobe exceeds the gain envelope given above by more than 6 dB. The region of the main reflector spillover energy is to be interpreted as a single lobe and shall not exceed the envelope by more than 6 dB.

(C) In all directions, the off-axis EIRP spectral-density for cross-polarized signals emitted from the ESV shall not exceed the following values:

5 - 10log(N) - 25logθ	dBW/4 kHz	for	$1.8° \leq \theta \leq 7.0°$
-16 - 10log(N)	dBW/4 kHz	for	$7.0° < \theta \leq 9.2°$

where θ and N are defined as set forth in paragraph (a)(1)(i)(A) of this section. This EIRP spectral-density applies in any plane that includes the line connecting the focal point of the antenna to the target satellite.

(D) For non-circular ESV antennas, the major axis of the antenna will be aligned with the tangent to the arc of the GSO at the orbital location of the target satellite, to the extent required to meet the specified off-axis EIRP spectral-density criteria.

(ii) Each ESV transmitter must meet one of the following antenna pointing requirements:

(A) Each ESV transmitter shall maintain a pointing error of less than or equal to 0.2° between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna, or

(B) Each ESV transmitter shall declare a maximum antenna pointing error that may be greater than 0.2° provided that the ESV does not exceed the off-axis EIRP spectral-density limits in paragraph (a)(1)(i) of this section, taking into account the antenna pointing error.

(iii) Each ESV transmitter must meet one of the following cessation of emission requirements:

(A) For ESVs operating under paragraph (a)(1)(ii)(A) of this section, all emissions from the ESV shall automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds 0.5°, and transmission will not resume until such angle is less than or equal to 0.2°, or

(B) For ESV transmitters operating under paragraph (a)(1)(ii)(B) of this section, all emissions from the ESV shall automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds the declared maximum antenna pointing error and shall not resume transmissions until such angle is less than or equal to the declared maximum antenna pointing error.

(2) The following requirements shall apply to an ESV that uses off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(1)(i) of this section. An ESV, or ESV system, operating under this subsection shall file certifications and provide a detailed demonstration as described in paragraph (b)(2) of this section.

(i) The ESV shall transmit only to the target satellite system(s) referred to in the certifications required by paragraph (b)(2) of this section.

(ii) If a good faith agreement cannot be reached between the target satellite operator and the operator of a future satellite that is located within 6 degrees longitude of the target satellite, the ESV operator shall accept the power-density levels that would accommodate that adjacent satellite.

(iii) The ESV shall operate in accordance with the off-axis EIRP spectral-densities that the ESV supplied to the target satellite operator in order to obtain the certifications listed in paragraph (b)(2) of this section. The ESV shall automatically cease emissions within 100 milliseconds if the ESV transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator.

(3) There shall be a point of contact in the United States, with phone number and address, available 24 hours a day, seven days a week, with authority and ability to cease all emissions from the ESVs, either directly or through the facilities of a U.S. Hub or a Hub located in another country with which the United States has a bilateral agreement that enables such cessation of emissions.

(4) For each ESV transmitter, a record of the ship location (*i.e.,* latitude/longitude), transmit frequency, channel bandwidth and satellite used shall be time annotated and maintained for a

period of not less than 1 year. Records will be recorded at time intervals no greater than every 20 minutes while the ESV is transmitting. The ESV operator will make this data available upon request to a coordinator, fixed system operator, fixed-satellite system operator, NTIA, or the Commission within 24 hours of the request.

(5) ESV operators communicating with vessels of foreign registry must maintain detailed information on each vessel's country of registry and a point of contact for the relevant administration responsible for licensing ESVs.

(6) ESV operators shall control all ESVs by a Hub earth station located in the United States, except that an ESV on U.S.-registered vessels may operate under control of a Hub earth station location outside the United States provided the ESV operator maintains a point of contact within the United States that will have the capability and authority to cause an ESV on a U.S.-registered vessel to cease transmitting if necessary.

(7) In the 10.95-11.2 GHz (space-to-Earth) and 11.45-11.7 GHz (space-to-Earth) frequency bands ESVs shall not claim protection from interference from any authorized terrestrial stations to which frequencies are either already assigned, or may be assigned in the future.

(b) Applications for ESV operation in the 14.0-14.5 GHz (Earth-to-space) band to GSO satellites in the fixed-satellite service must include, in addition to the particulars of operation identified on Form 312, and associated Schedule B, the applicable technical demonstrations in paragraphs (b)(1) or (b)(2) and the documentation identified in paragraphs (b)(3) through (b)(5) of this section.

(1) An ESV applicant proposing to implement a transmitter under paragraph (a)(1) of this section must demonstrate that the transmitter meets the off-axis EIRP spectral-density limits contained in paragraph (a)(1)(i) of this section. To provide this demonstration, the application shall include the tables described in paragraph (b)(1)(i) of this section or the certification described in paragraph (b)(1)(ii) of this section. The ESV applicant also must provide the value N described in paragraph (a)(1)(i)(A) of this section. An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section must provide the certifications identified in paragraph (b)(1)(iii) of this section. An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section must provide the demonstrations identified in paragraph (b)(1)(iv) of this section.

(i) Any ESV applicant filing an application pursuant to paragraph (a)(1) of this section must file three tables showing the off-axis EIRP level of the proposed earth station antenna in the direction of the plane of the GSO; the co-polarized EIRP in the elevation plane, that is, the plane perpendicular to the plane of the GSO; and cross polarized EIRP. In each table, the EIRP level must be provided at increments of 0.1° for angles between 0° and 10° off-axis, and at increments of 5° for angles between 10° and 180° off-axis.

(A) For purposes of the off-axis EIRP table in the plane of the GSO, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, and the plane of the GSO is determined by the focal point of the antenna and the line tangent to the arc of the GSO at the orbital position of the target satellite.

(B) For purposes of the off-axis co-polarized EIRP table in the elevation plane, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, and the elevation plane is defined as the plane perpendicular to the plane of the GSO defined in

paragraph (b)(1)(i)(A) of this section.

(C) For purposes of the cross-polarized EIRP table, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite and the plane of the GSO as defined in paragraph (b)(1)(i)(A) of this section will be used.

(ii) A certification, in Schedule B, that the ESV antenna conforms to the gain pattern criteria of § 25.209(a) and (b), that, combined with the maximum input power density calculated from the EIRP density less the antenna gain, which is entered in Schedule B, demonstrates that the off-axis EIRP spectral density envelope set forth in paragraphs (a)(1)(i)(A) through (a)(1)(i)(C) of this section will be met under the assumption that the antenna is pointed at the target satellite.

(iii) An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section, must provide a certification from the equipment manufacturer stating that the antenna tracking system will maintain a pointing error of less than or equal to 0.2º between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna and that the antenna tracking system is capable of ceasing emissions within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds 0.5°.

(iv) An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section must:

(A) declare, in their application, a maximum antenna pointing error and demonstrate that the maximum antenna pointing error can be achieved without exceeding the off-axis EIRP spectral-density limits in paragraph (a)(1)(A) of this section; and

(B) demonstrate that the ESV transmitter can detect if the transmitter exceeds the declared maximum antenna pointing error and can cease transmission within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds the declared maximum antenna pointing error, and will not resume transmissions until the angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna is less than or equal to the declared maximum antenna pointing error.

(2) An ESV applicant proposing to implement a transmitter under paragraph (a)(2) of this section and using off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(1)(i) of this section shall provide the following certifications and demonstration as exhibits to its earth station application:

(i) A statement from the target satellite operator certifying that the proposed operation of the ESV has the potential to create harmful interference to satellite networks adjacent to the target satellite(s) that may be unacceptable.

(ii) A statement from the target satellite operator certifying that the power-density levels that the ESV applicant provided to the target satellite operator are consistent with the existing coordination agreements between its satellite(s) and the adjacent satellite systems within 6° of orbital separation from its satellite(s).

(iii) A statement from the target satellite operator certifying that it will include the power-density levels of the ESV applicant in all future coordination agreements.

(iv) A demonstration from the ESV operator that the ESV system is capable of detecting and automatically ceasing emissions within 100 milliseconds when the transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator.

(3) There shall be an exhibit included with the application describing the geographic area(s) in which the ESVs will operate.

(4) The point of contact referred to in paragraph (a)(3) and, if applicable paragraph (a)(6) of this section, must be included in the application.

(5) ESVs that exceed the radiation guidelines of Section 1.1310 Radiofrequency radiation exposure limits must provide, with their environmental assessment, a plan for mitigation of radiation exposure to the extent required to meet those guidelines.

(c) Operations of ESVs in the 14.0-14.2 GHz (Earth-to-space) frequency band within 125 km of the NASA TDRSS facilities on Guam (located at latitude: 13° 36' 55" N, longitude 144° 51' 22" E) or White Sands, New Mexico (latitude: 32° 20' 59" N, longitude 106° 36' 31" W and latitude: 32° 32' 40" N, longitude 106° 36' 48"W) are subject to coordination through the National Telecommunications and Information Administration (NTIA) Interdepartment Radio Advisory Committee (IRAC). When NTIA seeks to provide similar protection to future TDRSS sites that have been coordinated through the IRAC Frequency Assignment Subcommittee process, NTIA will notify the Commission that the site is nearing operational status. Upon public notice from the Commission, all Ku-band ESV operators must cease operations in the 14.0-14.2 GHz band within 125 km of the new TDRSS site until after NTIA/IRAC coordination for the new TDRSS facility is complete. ESV operations will then again be permitted to operate in the 14.0-14.2 GHz band within 125 km of the new TDRSS site, subject to any operational constraints developed in the coordination process.

(d) Operations of ESVs in the 14.47-14.5 GHz (Earth-to-space) frequency band within a) 45 km of the radio observatory on St. Croix, Virgin Islands (latitude 17° 46' N, longitude 64° 35' W); b) 125 km of the radio observatory on Mauna Kea, Hawaii (at latitude 19° 48' N, longitude 155° 28' W); and c) 90 km of the Arecibo Observatory on Puerto Rico (latitude 18° 20' 46" W, longitude 66° 45' 11" N) are subject to coordination through the National Telecommunications and Information Administration (NTIA) Interdepartment Radio Advisory Committee (IRAC).

5. Section 25.271 is amended by revising paragraphs (b) and (c) and by removing paragraph (f) to read as follows:

§ 25.271 Control of transmitting stations.

* * *

(b) The licensee of a transmitting earth station licensed under this part shall ensure that a trained operator is present on the earth station site, or at a designated remote control point for the earth station, at all times that transmissions are being conducted. No operator's license is required for a person to operate or perform maintenance on facilities authorized under this part.

(c) Authority will be granted to operate a transmitting earth station by remote control only on the conditions that:

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