

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

In the Matter of
ARINC Incorporated
Request to Communicate with
Non-U.S. Satellite
File Nos.: SES-MOD-20070220-00260,
SES-AMD-20070502-00543
Call Sign: E030205

ORDER AND AUTHORIZATION

Adopted: November 19, 2007

Released: November 20, 2007

By the Chief, International Bureau and the Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this Order and Authorization, we modify ARINC Incorporated's ("ARINC") Aeronautical Mobile-Satellite Service (AMSS) authorization by granting ARINC's request for authority for aeronautical earth stations (AES) to communicate with the Estrela do Sul satellite at the 63° W.L. orbital location, in various portions of the conventional Ku-band over the North Atlantic Oceanic Region (NAOR). Our action expands the availability of two-way broadband connectivity to passengers and crew for international flights and continues our efforts to enhance competition in an important sector of the mobile telecommunications market.

II. BACKGROUND

A. The Aeronautical Mobile Satellite Service

2. The 2003 World Radiocommunications Conference (WRC-03) added a worldwide secondary AMSS allocation in the 14.0-14.5 GHz band. Later in 2003, the Commission

1 As used in this Order, the term "conventional Ku-band" refers to the 11.7-12.2 GHz (downlink) and 14.0-14.5 GHz (uplink) bands. The "conventional" Ku-bands are allocated on a primary basis to the FSS. See generally 47 C.F.R. § 2.106.

2 WRC-03 Provisional Final Acts at 34-38. These pages show a new "Mobile-satellite (Earth-to-space)" allocation in this band in all three Regions, as well as new footnote 5.AA13 (since re-numbered as 5.504A), which reads: "In the band 14-14.5 GHz, aircraft earth stations in the secondary aeronautical mobile-satellite service may also communicate with space stations in the fixed-satellite service. The provisions of Nos. 5.29, 5.30 and 5.31 apply." ITU Radio Regulation Nos. 5.29, 5.30, 5.31 state that stations of a secondary service:

conformed the U.S. Table of Frequency Allocations (“U.S. Table” or “Table”) to this international allocation, finding it would facilitate an important new use of the 14.0-14.5 GHz band.³ On February 9, 2005, the Commission released a Notice of Proposed Rulemaking seeking comment on a regulatory framework for licensing the operation of AMSS systems to communicate with fixed-satellite service (FSS) networks in the Ku-band.⁴ Among other things, the *AMSS Notice* seeks comment on a blanket licensing scheme for AES based on off-axis equivalent isotropically radiated power (e.i.r.p.) criteria for the protection of adjacent satellites and a regulatory framework to protect domestic operations from foreign-licensed AMSS systems that might pass through U.S. airspace. At present, however, there are no Commission service rules that specifically refer to licensing or operation of AMSS in the Ku-band.

B. The SKYLink System

3. In September 2003, ARINC filed an application for full-scale commercial operation of its AMSS network, known as the SKYLink System.⁵ The application requested blanket authority to operate up to 1000 technically identical transmit and receive mobile earth stations aboard aircraft in the Ku-band (using the 11.7-12.2 GHz band for space-to-Earth transmissions and the 14.0-14.5 GHz band for Earth-to-space transmissions) operating within the United States and adjacent territorial waters to provide two-way, wideband services to aircraft passengers and crew. In granting the SKYLink Application in April 2005, the Commission required that ARINC operate consistent with the technical parameters specified in its application.⁶ ARINC was initially authorized to communicate with SES Americom’s AMC-1 satellite at 103° W.L., and later received authority to communicate instead with SES Americom’s AMC-6 satellite at 72° W.L.⁷ Under its existing SKYLink authorization, ARINC is not permitted to cause harmful interference to other allocated services in the 11.7-12.2 GHz frequency band, and must accept all

5.29 a) shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

5.30 b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

5.31 c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.

³ Amendment of Parts 2, 25, and 87 of the Commission’s Rules to Implement Decisions from the World Radiocommunications Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range, ET Docket No. 02-305, *Report and Order*, 18 FCC Rcd 23426, 23454 at para. 76 (2003) (“*Above 28 MHz Allocation Order*”).

⁴ Service Rules and Procedures to Govern the Use of Aeronautical Mobile Satellite Service Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service, IB Docket No. 05-20, *Notice of Proposed Rulemaking*, 20 FCC Rcd 2906 (2005) (“*AMSS Notice*”).

⁵ Application of ARINC Incorporated for Blanket Authority for Operation of Up to One Thousand Technically Identical Ku-Band Transmit/Receive Airborne Mobile Stations Aboard Aircraft Operating in the United States and Adjacent Waters, File No. SES-LIC-20030910-01261 (September 2, 2003) (“SKYLink Application”).

⁶ ARINC Incorporated Application for Blanket Authority for Operation of Up to One Thousand Technically Identical Ku-Band Transmit/Receive Airborne Mobile Stations Aboard Aircraft Operating in the United States and Adjacent Waters, *Order and Authorization*, 20 FCC Rcd 7553, 7572 para. 58 (2005) (“*ARINC Transmit-Receive Order*”).

⁷ File No. SES-MOD-20050829-01185 and Satellite Communications Information Re: Actions Taken, *Public Notice*, Report No. SES-00757, October 12, 2005.

interference from authorized users of this band.⁸ ARINC's uplink operations in the 14.0-14.5 GHz band are on a secondary basis. Also, ARINC's authorization is limited to AES traveling in United States airspace, including airspace over United States territorial waters.⁹ ARINC is obliged by the terms of its current authorization to ensure that the probability of exceeding a one-dB margin below the very small aperture terminal (VSAT) off-axis e.i.r.p. envelope does not exceed 0.001 percent.¹⁰

C. ARINC's Modification Application

4. In its February 2007 Modification Application, ARINC seeks authority to provide two-way wideband services over the North Atlantic Oceanic Region by adding a new satellite point of communication to its license.¹¹ In a March 2007 Amendment to this Modification Application, ARINC clarifies that the new satellite point of communication referenced in the Modification Application is the Loral Telstar 14 (Estrela do Sul) satellite at the 63° W.L. orbital location, licensed by Brazil.¹² ARINC intends to use the Estrela do Sul's NAOR beam and operate in the 14.0-14.5 GHz and 11.7-12.2 GHz frequency bands.

5. ARINC's initial AMSS authorization was limited to AES transmissions on U.S.-registered aircraft traveling through the airspace of the United States and its territorial waters. With the Modification Application, ARINC is requesting for the first time to provide AMSS onboard U.S.-registered aircraft flying over international waters (*i.e.*, "high seas," or regions beyond the territorial limits of any country) and through foreign airspace. The Estrela do Sul's NAOR beam provides some coverage of the U.S. in addition to coverage over the North Atlantic Ocean. ARINC says that operations with Estrela do Sul will be at power levels not exceeding 1 dB below the e.i.r.p. envelope under which it currently operates.¹³

⁸ *ARINC Transmit-Receive Order*, 20 FCC Rcd 7553, 7572, para. 58.

⁹ Consistent with Presidential proclamation and the United Nations Convention on the Law of the Sea, the territorial waters would extend 12 nautical miles from the baselines of the geographic areas described in 47 U.S.C. § 153(51). See Presidential Proclamation No. 5928, 54 Fed. Reg. 777 (1988). This approach is consistent with the international law principle that each nation has exclusive jurisdiction over the airspace above its land territory and territorial waters. See U.N. Convention on the Law of the Sea, 21 I.L.M. 1261, at Part II, Art. 2 (opened for signature 1982).

¹⁰ *ARINC Transmit-Receive Order*, 20 FCC Rcd 7553, 7567 at para. 43 and 7573 at 58(k). The e.i.r.p. spectral density envelope for VSAT networks is established in Sections 25.134 and 25.209 of the Commission's rules. See 47 C.F.R. §§ 25.134, 25.209.

¹¹ ARINC Incorporated, Request for Authorization to Communicate with Non-U.S. Satellite, File No. SES-MOD-20070220-00260, filed Feb. 16, 2007 ("Modification Application").

¹² ARINC Incorporated, Request for Authorization to Communicate with Non-U.S. Satellite, Amendment, File No. SES-AMD-20070502-00543, filed March 27, 2007 ("ARINC Amendment"). According to the coverage map included in its amendment, ARINC will use the NAOR beam to serve portions of the northeastern United States, Canada, Greenland, Iceland, Ireland, the U.K., and France in addition to the airspace over the North Atlantic. ViaSat, Inc. operates the hub station that will communicate with the Estrela do Sul. See File No. SES-LIC-20070125-00142, granted July 3, 2007 (see Satellite Communications Services Information re: Actions Taken, *Public Notice*, Report No. SES-00944, July 11, 2007).

¹³ ARINC Amendment, Clarification Letter from William M. Kolb, Director, SKYLink Business Aircraft, to Marlene H. Dortch, Secretary, Federal Communications Commission, filed March 15, 2007 ("Clarification Letter").

6. The Bureau placed the Modification Application on public notice on February 28, 2007,¹⁴ and received no comments in response. The Bureau placed the ARINC Amendment on public notice on May 9, 2007,¹⁵ and also received no comments in response.

III. Discussion

A. AMSS Operations in Foreign and International Airspace – General Framework

7. We have not previously authorized any AES to operate outside of U.S. airspace. In the *AMSS Notice*, the Commission recognized that aircraft routes are not confined within the borders of the United States and that U.S.-registered aircraft travel international routes both to and from the United States.¹⁶ Section 301(e) of the Act provides that no person shall engage in radio communication “upon any vessel or aircraft of the United States” without a Commission license.¹⁷ The Commission observed that the Act does not indicate that its jurisdiction is restricted to the location of vessels or aircraft. Therefore, the Commission concluded that its licensing obligation for U.S.-registered aircraft would apply regardless of whether the AES operates in U.S. or international airspace.¹⁸

8. In light of the Commission’s licensing obligations concerning AES operations in the airspace beyond the United States and its territorial waters, we must determine how to implement this obligation on an interim basis until the Commission adopts final rules. In particular, we are concerned with the protection of FSS and terrestrial fixed services (FS) that may be operating in foreign countries in the 14.0-14.5 GHz band. Protection of FSS operations is addressed below; in this section we discuss protection of foreign terrestrial fixed services. In the *AMSS Notice*, the Commission proposed using the International Telecommunication Union’s (ITU) power flux-density (pfd) recommendations for the protection of fixed terrestrial services.¹⁹ The ITU radio regulations note several nations that require AMSS operations in their airspace to comply with the ITU-recommended pfd limits.²⁰ Under the pfd proposal, when an AMSS provider operates in the 14.0-14.5 GHz frequency band in international airspace within line-of-sight of the territory of an administration where fixed service networks have a primary allocation, the maximum pfd produced at the surface of the Earth by emissions from a single AES in the network should not

¹⁴ Satellite Communications Services Re: Satellite Radio Applications Accepted for Filing, *Public Notice*, Report No. SES-00904, Feb. 28, 2007.

¹⁵ Satellite Communications Services Re: Satellite Radio Applications Accepted for Filing, *Public Notice*, Report No. SES-00924, May 9, 2007.

¹⁶ *AMSS Notice*, 20 FCC Rcd 2906, 2935 at para. 57.

¹⁷ See 47 U.S.C. § 301(e).

¹⁸ *AMSS Notice*, 20 FCC Rcd 2906, 2935 at para. 57. In other contexts, the Commission also has authority to license transmitting facilities that operate outside of U.S. territory. See, e.g., Procedures to Govern Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands, *Report and Order*, 20 FCC Rcd 674 (2005), in which the Commission established licensing and service rules for Earth Stations on Vessels (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. Sea-faring vessels travel through international shipping lanes well beyond 12 nautical miles from the U.S. shore.

¹⁹ *AMSS Notice*, 20 FCC Rcd 2906, 2931 at para. 46.

²⁰ See ITU Radio Regulations, Article 5, Frequency Allocations, footnotes 5.504C, 5.508A, 5.509A; see also Recommendation ITU-R M.1643, Annex One.

exceed the following values, unless the administration has imposed other conditions for protecting its FS stations:

$$\begin{array}{ll} -132 + 0.5 \cdot \Theta \text{ dB (W/(m}^2 \cdot \text{MHz))} & \text{for } \Theta \leq 40^\circ \\ -112 \text{ dB (W/(m}^2 \cdot \text{MHz))} & \text{for } 40^\circ < \Theta \leq 90^\circ \end{array}$$

Where: Θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal) and the aforementioned limits relate to the pfd and angles of arrival that would be obtained under free-space propagation conditions.²¹

To the extent that all relevant administrations have identified geographic areas from which AMSS operations would not affect their radio operations, the Commission proposed that AMSS operators would be free to operate within those identified areas without further Commission action.²²

9. We condition our grant of ARINC's Modification Application according to the proposed framework described above. Thus, prior to operations of an AES in or near a foreign administration's airspace, ARINC must determine whether that administration has adopted any specific requirements regarding the protection of fixed terrestrial services from AES operations. ARINC must operate according to pfd limits specified in this Order, unless the foreign administration has imposed other conditions for the protection of fixed service systems. To the extent that all relevant administrations have identified geographic areas from which AMSS operations would not affect their radio operations, ARINC can operate within those identified areas without further Commission action. We find that this framework will adequately protect potentially affected FS operations of other administrations until final rules are adopted in the AMSS rulemaking proceeding. Furthermore, we take this action without prejudice to the Commission's adoption of final AMSS rules.

10. ARINC will also be required to follow the protection criteria established internationally for foreign radio-astronomy sites. In particular, Footnote 5.504B to the International Table of Frequency Allocations provides that AES operating in the 14.0-14.5 GHz band

shall comply with the provisions of Annex 1, Part C of Recommendation ITU-R M.1643, with respect to any radio astronomy station performing observations in the 14.47-14.5 GHz band located on the territory of Spain, France, India, Italy, the United Kingdom and South Africa. (47 C.F.R. § 2.106, International footnote 5.504B).

The ITU's Recommendation ITU-R M.1643 sets forth the technical and operational requirements for AMSS networks in the 14.0-14.5 GHz band; Annex 1, Part C sets forth the pfd levels for the protection of radio astronomy sites.

11. ARINC is subject to all of the conditions we imposed in 2005, including those regarding protection of NASA's Tracking and Data Relay Satellite System (TDRSS) operations and U.S. radio astronomy stations observing in the 14.0-14.5 GHz band. The new operations authorized by this Order will also be subject to these conditions. These conditions are detailed in

²¹ *AMSS Notice*, 20 FCC Rcd 2906, 2931 at para. 46.

²² *AMSS Notice*, 20 FCC Rcd 2906, 2936 at para. 58.

ARINC's signed coordination agreement with NASA pertaining to protection of TDRSS operation and a signed agreement with the National Science Foundation (NSF) pertaining to protection of radio-astronomy observation.²³ NASA has proposed a new TDRSS site at Blossom Point, MD, geographic coordinates 38° 25' 44" N, 77° 05' 20" W, with a terrain height of about 0 m above mean sea level. ARINC will need to update its coordination agreement with NASA to include operations within 400 km of the new TDRSS site at Blossom Point, MD. ARINC will be required to cease operations within 400 km of the new Blossom Point facilities when those facilities become operational, unless ARINC reaches an agreement with NASA permitting such operations.

B. Additional Point of Communication

12. In authorizing ARINC's operations over international waters, protection of adjacent satellite operators is among our chief concerns. The Estrela do Sul satellite that ARINC seeks to add as an additional point of communication will provide some coverage of the U.S. in addition to coverage over the North Atlantic Oceanic Region.²⁴ In 2002, the Estrela do Sul operator requested Commission authority to access the United States market. In granting that request, the Bureau's Satellite Division found that this satellite meets Commission technical requirements.²⁵ Consequently, we do not need to revisit those issues in deciding whether to grant ARINC access to the Estrela do Sul. The aeronautical mobile service that ARINC will be able to provide with Estrela do Sul is covered by the U.S. market opening commitments in the WTO Basic Telecom Agreement.²⁶ Granting ARINC access to the Estrela do Sul satellite will serve the public interest by enabling ARINC to provide seamless broadband connectivity to flights on international routes, provided that ARINC's operations are within parameters coordinated with adjacent operators. We have additional assurance that ARINC's AMSS operations will not interfere with satellites operating adjacent to Estrela do Sul because of ARINC's stated intention to continue operating with a 1 dB margin relative to the aggregate off-axis VSAT e.i.r.p envelope.²⁷

²³ *Ex Parte* Letter re: File No. SES-LIC-20030910-01261 from Carl R. Frank, ARINC Counsel, to Marlene H. Dortch, Secretary, Federal Communications Commission dated Sept. 30, 2004.

²⁴ Estrela do Sul's NAOR beam covers both a portion of the northeast U.S. and foreign/international airspace.

²⁵ Loral Skynet do Brasil Petition for Declaratory Ruling to Add Estrela do Sul 1, a Ku-band Satellite, to the Permitted Space Station List, *Order*, DA 03-4095 (2003).

²⁶ See Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Satellites Providing Domestic and International Service in the United States, *Report and Order*, IB Docket No. 96-111, 12 FCC Rcd 24094 (1997) ("*DISCO II*" or "*DISCO II Order*"). The Commission's *DISCO II Order* adopted a framework under which the Commission would consider requests for non-U.S. licensed satellite systems to serve the United States. In *DISCO II*, the Commission established a rebuttable presumption in favor of entry by non-U.S. satellites licensed by World Trade Organization (WTO) Members to provide services covered by the U.S. commitments under the WTO Agreement on Basic Telecommunications Services (WTO Basic Telecom Agreement). For a more detailed summary of the *DISCO II* framework, 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, *First Order on Reconsideration*, IB Docket No. 96-111, 15 FCC Rcd 7207, 7209-10 (paras. 4-5) (1999) ("*DISCO II First Reconsideration Order*").

²⁷ See Clarification Letter; see also *ARINC Transmit-Receive Order*, 20 FCC Rcd 7553, 7572, para. 58.

IV. CONCLUSION

13. We find, pursuant to Section 309 of the Communications Act, 47 U.S.C. § 309, that grant of authority to modify ARINC's AMSS license as conditioned herein will serve the public interest, convenience, and necessity.

V. ORDERING CLAUSES

14. Accordingly, IT IS ORDERED that Application File No. SES-MOD-20070220-00260, as amended by SES-AMD-20070502-00543, is GRANTED to the extent indicated herein and the AES authorization of ARINC Incorporated, call sign E030205, IS MODIFIED to permit operation of up to 1,000 earth stations aboard aircraft with the following additional satellite, in the specified frequency bands, in the United States,²⁸ including the airspace above the territorial waters,²⁹ and in airspace beyond the territorial waters of the United States:

Satellite	Location	Transmit Band	Receive Band
Estrela do Sul	63° W.L.	14.0-14.5 GHz	11.7-12.2 GHz

The ARINC Company will operate its transmit-receive earth stations in accordance with the terms, conditions, and technical specifications set forth in its applications, the Federal Communications Commission's Rules and the following conditions:

- a) The newly authorized operations are subject to the terms and conditions previously specified concerning call sign E030205,³⁰ except to the extent that those terms and conditions are modified herein.
- b) AES operations shall not cause harmful interference to any authorized station (including foreign-authorized stations) operating in compliance with the Table of Allocations, either domestically (non-Federal and Federal stations) or internationally, in the receive frequency bands identified in this paragraph (*see also* 47 C.F.R. § 2.106). ARINC shall immediately terminate its AMSS operation upon notification that such operation is causing harmful interference, not permitted under the terms of a pertinent coordination agreement, with lawful operation of any radio system in the receive frequency bands identified in this paragraph and authorized in conformance with the Table of Allocations;
- c) AES operations in the 11.7-12.2 GHz band shall be in accordance with the space station authorization for the Estrela do Sul satellite and shall not generate e.i.r.p. density greater than 7.96 dBW/4kHz.
- d) When ARINC operates in the 14.0-14.5 GHz frequency band in the international airspace within line-of-sight of the territory of a foreign administration where fixed service networks have primary allocation in this

²⁸ See 47 U.S.C. § 153(51) ("The term 'United States' means the several States and Territories, the District of Columbia, and the possessions of the United States, but does not include the Canal Zone.")

²⁹ See *supra* footnote 9.

³⁰ See *ARINC Transmit-Receive Order*, 20 FCC Rcd 7553.

band, the maximum pfd produced at the surface of the Earth by emissions from a single AES in ARINC's network should not exceed the following values unless the foreign administration has imposed other conditions for protecting its FS stations:

$$\begin{array}{ll} -132 + 0.5 \cdot \Theta \text{ dB(W/(m}^2 \cdot \text{MHz))} & \text{for } \Theta \leq 40^\circ \\ -112 \text{ dB(W/(m}^2 \cdot \text{MHz))} & \text{for } 40^\circ < \Theta \leq 90^\circ \end{array}$$

Where: Θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal) and the aforementioned limits relate to the pfd and angles of arrival would be obtained under free space propagation conditions.

To the extent that all relevant administrations have identified geographic areas from which AMSS operations would not affect their radio operations, ARINC is free to operate its AES within those identified areas without further action.

- e) ARINC's AES operations in the 14.0-14.5 GHz band shall comply with the provisions of Annex 1, Part C of Recommendation ITU-R M.1643, with respect to any radio astronomy station performing observations in the 14.47-14.5 GHz band.
- f) ARINC AMSS operation shall immediately terminate upon notification that such operation is causing harmful interference, not permitted under the terms of pertinent coordination agreements, with (1) lawful operation of any radio system in the 14.0-14.5 GHz band authorized on a primary basis in conformance with the U.S. Table of Frequency Allocations or authorized on a secondary basis prior to the effective date of this order, or (2) operation of any TDRSS earth station in the band 14-14.2 GHz, or (3) radio astronomy observations in the 14.47-14.5 GHz band.
- g) ARINC will need to update its coordination agreement with NASA to include operations within 400 km of the new TDRSS site at Blossom Point, MD. ARINC will be required to cease operations within 400 km of the new Blossom Point facilities when those facilities become operational, unless ARINC reaches an agreement with NASA permitting such operations.

15. This Order and Authorization and all conditions contained herein are subject to the final outcome of the Commission's rulemaking in IB Docket No. 05-20 and The ARINC SKYLink System shall operate in compliance with any pertinent rule requirements subsequently adopted by the Commission.

16. ARINC is afforded thirty days from the date of release of this Order to decline this authorization as conditioned. Failure to respond within this period will constitute formal acceptance of the authorization as conditioned.

17. This Order and Authorization is issued pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective upon release.

FEDERAL COMMUNICATIONS COMMISSION

Helen Domenici
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