

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

In the Matter of)	
)	
Iridium Constellation LLC)	File No. SAT-MOD-19961204-00139
)	SAT-AMD-20050816-00160
)	SAT-AMD-20051118-00236
)	Call Sign: S2110
For Authority to Modify License For A Low Earth)	
Orbit Mobile Satellite System)	

MEMORANDUM OPINION AND ORDER

Adopted: February 4, 2013

Released: February 4, 2013

By the Chief, International Bureau:

I. INTRODUCTION

1. With this Order, we grant the above-captioned application insofar as it requests modification of the space-station license held by Iridium Constellation LLC (“Iridium”)¹ to add authority to provide Aeronautical Mobile-Satellite (Route) Service (“AMS(R)S”)² in the 1618.725-1626.5 MHz band.³ Consistent with Standards and Recommended Practices (“SARPs”) developed by the International Civil Aviation Organization (“ICAO”),⁴ the modified license includes conditions limiting Iridium’s AMS(R)S to geographic areas in which it is unlikely to receive interference from established primary services in adjacent frequency bands. Grant of this application would serve the public interest by providing enhanced options for safety communications with aircraft in areas in which such communications are currently unavailable or limited.

II. BACKGROUND

2. The Iridium system, which commenced commercial operation in 1998, provides voice and data Mobile-Satellite Service (“MSS”) via a constellation of non-geostationary-orbit satellites, using a time-division/frequency-division multiple-access protocol. As originally granted in 1995, the Iridium

¹ Iridium is a successor-in-interest to Motorola Satellite Communications, Inc., the original licensee for the Iridium system satellites and the original applicant in the captioned modification application. For ease of reference, we use the term “Iridium” in this Order to refer to both Iridium and its predecessors-in-interest.

² Mobile-Satellite Service is satellite communication service for users equipped with earth stations that can be operated while in motion. AMS(R)S is radio communication service linking aircraft earth stations via satellite to ground stations or other aircraft stations, reserved for communications concerning safety and regularity of aircraft flight along national or international civil air routes. *See* 47 C.F.R. §2.1.

³ We dismiss, as duplicative, an amendment, IBFS File No. SAT-AMD-20051118-00236, proposing modification of the orbital debris mitigation plan for the Iridium system, as the licensee is requesting the same modification in another pending application. *See* Application of Iridium Constellation LLC for Minor Modification of Mobile-Satellite Service Authorization to Update Orbital Debris Mitigation Requirements, IBFS File No. SAT-MOD-20080701-00140.

⁴ ICAO, which operates under the auspices of the United Nations, issues SARPs for aviation communications systems that are binding upon ICAO contracting states, including the United States.

space-station license authorized use of the 1621.35-1626.5 MHz frequency band for transmission in both directions between satellites and mobile earth stations.⁵ The International Bureau noted when granting the license that although the 1610-1626.5 MHz band is allocated for MSS uplink transmission on a primary basis, it is allocated for MSS downlink operation only on a secondary basis. Hence, the Bureau observed that the Iridium space-station licensee would be obliged to ensure that its MSS downlink operations would not harmfully interfere with primary services.⁶

3. The 1610-1626.5 MHz band is also allocated for AMS(R)S on a primary basis regardless of the direction of transmission.⁷ Iridium requested authority for AMS(R)S in an application for license modification filed in 1996. According to the application, Iridium aircraft earth stations would be used for air traffic control communications, communications pertaining to weather, flight planning, dispatch, maintenance, and cabin provisioning, and non-safety-related air-to-ground communications for crew or passengers.⁸ Iridium stressed that because its satellites can relay transmissions via inter-satellite crosslinks and are deployed in orbits that converge at the Earth's poles, the Iridium system (unlike MSS systems with satellites deployed in geostationary equatorial orbits) could provide continuous coverage at high latitudes where many intercontinental flights are routed.⁹ Iridium asserted, moreover, that its aircraft earth stations, unlike aircraft earth stations linking with geostationary-orbit satellites, would not need large steered antennas and would therefore be suitable for installation in all classes of aircraft, from light single-engine to heavy commercial transport.¹⁰

4. Several parties filed petitions to deny Iridium's application,¹¹ including the licensed operator of the Globalstar MSS system,¹² which was using the 1610-1621.35 MHz band for uplink transmissions from mobile earth stations to another constellation of non-geostationary-orbit satellites.¹³ Another petitioner was AMSC, the operator of a U.S.-licensed MSS system that used portions of the 1626.5-1660.5 MHz band for uplinks from mobile stations to a geostationary-orbit satellite. Both the

⁵ *Motorola Satellite Communications, Inc.*, Order and Authorization, 10 FCC Rcd 2268 (Int'l Bur. 1995), corrected by *Erratum*, 10 FCC Rcd 3915 (1995), recon. denied 11 FCC Rcd 18502 (1996).

⁶ *Id.*, ¶ 16. A station lawfully using a frequency band for service of a type for which the band is allocated on a primary basis is entitled to protection against interference from stations that use the band for secondary-status services. Stations operating in a secondary service cannot claim interference protection from stations lawfully operating in a primary service. See 47 C.F.R. §§ 2.104(d) and 2.105(c).

⁷ See 47 C.F.R. § 2.106, Footnote 5.367.

⁸ Application of Motorola Satellite Communications, Inc. for Authority to Modify its License for a Low Earth Orbit Satellite System in the 1616-1626.5 MHz Band, filed Dec. 4, 1996, IBFS File No. SAT-MOD-19961204-00139 ("Original Iridium AMS(R)S Application"), Appendix at 10.

⁹ *Id.* at 5 and Appendix at 3; Consolidated Opposition and Reply Comments of Motorola Satellite Communications, Inc. filed April 1, 1997, at 3. The Commission commented on the coverage characteristics of non-geostationary satellite systems as compared with geostationary systems in *Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483-2500 MHz Frequency Bands*, 9 FCC Rcd 5936 at ¶ 16 (1994).

¹⁰ Original Iridium AMS(R)S Application, Appendix at 3.

¹¹ Petition to Deny filed by TRW Inc. on Feb. 18, 1997 ("TRW Petition"); Petition to Dismiss or Deny filed by Mobile Communications Holdings, Inc. on Feb. 18, 1997 ("MCHI Petition"); Petition to Deny or Grant with Conditions filed by L/Q Licensee, Inc. on Feb. 18, 1997 ("L/Q Petition"); Petition to Deny filed by AMSC Subsidiary Corp. on Feb. 18, 1997 ("AMSC Petition").

¹² The license for the Globalstar system was at that time held by L/Q Licensee, Inc. For ease of reference, we refer in this Order to L/Q Licensee, Inc. and its successors in interest as "Globalstar."

¹³ The Globalstar space-station license was granted simultaneously with the Iridium license. See *Loral/Qualcomm Partnership, L.P.*, Order and Authorization, 10 FCC Rcd 2333 (Int'l Bur. 1995).

Globalstar system and the MSS system formerly licensed to AMSC are still in operation today in frequency bands immediately adjacent to the band that the Iridium system uses for uplinks and downlinks between satellites and mobile earth stations.¹⁴ The Globalstar system now uses the 1610-1618.725 MHz band for mobile uplinks, sharing the 1617.775-1618.725 MHz segment co-equally with the Iridium system, which is currently authorized to operate in the 1617.775-1626.5 MHz band.¹⁵

5. Globalstar and other petitioners expressed concern that Iridium's request for AMS(R)S authority was a ploy to upgrade the status of Iridium's downlink operations from secondary to super-primary.¹⁶ These petitioners maintained that it would be unfair to force previously-licensed systems to limit their operations in order to protect Iridium's AMS(R)S from interference, in view of the fact that Iridium had not applied for AMS(R)S authority until long after the cut-off date for mutually-exclusive applications for MSS operations in the 1610-1626.5 MHz band.¹⁷ In response, Iridium maintained that interference and protection issues could be resolved through coordination.¹⁸ Globalstar, AMSC, and other petitioners replied that Iridium had failed to show that it was technically feasible for AMS(R)S to be provided via the Iridium system without imposing additional restrictions on previously-licensed MSS systems.¹⁹ Further, Globalstar and another petitioner contended that imposition of such restrictions on previously-licensed systems to protect Iridium's AMS(R)S was not contemplated by the Commission when it adopted service rules for MSS in the 1610-1626.5 MHz band.²⁰

6. The Federal Aviation Administration ("FAA") also filed comments.²¹ The FAA's 1997 comments stressed that ICAO had not established SARPs for aeronautical radio service via the Iridium system and maintained that any consideration of Iridium's application before ICAO reached a decision on the acceptability of Iridium AMS(R)S would be premature. In the ensuing years, ICAO and the FAA worked to revise SARPs for AMS(R)S, which had historically focused on provision of AMS(R)S by the Inmarsat system, to instead include a generic AMS(R)S SARP, supported by system-specific documentation.

¹⁴ The space-station license issued to AMSC, after passing through the hands of intermediate successors-in-interest, is now held by LightSquared Subsidiary LLC, which also has a license for operation of a second-generation space station in the 1.5/1.6 GHz MSS band. *SkyTerra Communications Inc., Transferor and Harbinger Capital Partners Funds, Transferee, Applications for Consent to Transfer Control of SkyTerra Subsidiary, LLC*, Memorandum Opinion and Order and Declaratory Ruling, IB Docket No. 08-184, 24 FCC Rcd 3059 (2010).

¹⁵ See *Globalstar Licensee LLC et al., Modification of Authority to Operate a Mobile Satellite System in the 1.6 GHz Frequency Band*, Order of Modification, 23 FCC Rcd 15207 (2008).

¹⁶ L/Q Petition at 2; TRW Petition at 7-8; MCHI Petition at 2.

¹⁷ L/Q Petition at 9; MCHI Petition at 2; TRW Petition at 6 and 8. TRW and AMSC maintained that Iridium aircraft terminals would receive harmful interference unless onerous restrictions were imposed on mobile terminal operation in adjacent bands. One petitioner estimated that a CDMA MSS terminal operating within limits previously agreed upon as suitable to protect ordinary Iridium operation could cause objectionable interference to reception of Iridium AMS(R)S downlinks in aircraft within a radius of up to 106 kilometers. TRW Petition, Technical Appendix. AMSC submitted a similar showing. AMSC Petition, Technical Appendix.

¹⁸ Consolidated Opposition and Reply Comments of Motorola Satellite Communications, Inc. filed Apr. 1, 1997, at 9 and 21.

¹⁹ L/Q Reply to Consolidated Opposition filed Apr. 21, 1997 at 2, 6-7, and 9; Reply of TRW to Consolidated Opposition filed Apr. 21, 1997 at 4 and 6-7; AMSC Subsidiary Corp. Reply filed Apr. 21, 1997 at 1.

²⁰ L/Q Reply at 2, 7, and n.6; TRW Reply at 12.

²¹ Letter with attachment from Gerald J. Markey to the FCC Secretary dated February 21, 1997.

7. In August 2005, and in response to an inquiry from Commission staff,²² Iridium reported that it was helping ICAO develop technical standards for provision of AMS(R)S via the Iridium system.²³ In December 2011, Iridium informed the Commission of further developments. First, it reported that ICAO had reviewed and approved a system-specific technical manual and validation report for Iridium AMS(R)S, as required by generic AMS(R)S SARPs.²⁴ Iridium also pointed out that the FAA had issued a Technical Standard Order specifying performance requirements for approval of Iridium aircraft earth stations for air traffic control communications and other AMS(R)S operations.²⁵ Finally, Iridium reported that in June 2011 the FAA announced that it approved use of Iridium equipment for AMS(R)S in oceanic and remote airspace.²⁶ Iridium therefore requested prompt grant of its application for modification of its space-station license to include AMS(R)S authority.

8. We placed the filing of December 13, 2011 on public notice, inviting interested parties to file comments by January 11, 2012.²⁷ We received comments from Globalstar, Inc.,²⁸ Inmarsat, Inc.,²⁹ and three air carriers³⁰ and reply comments from Iridium. Globalstar and Inmarsat request certain conditions on any grant, while the air carriers support a grant.

III. DISCUSSION

9. We agree with Iridium that with advancement of the technical standardization process, grant of the application is now timely. We discuss briefly below the conditions and scope of this action.

10. *Geographic Limitations on AMS(R)S authority.* We will limit this grant to oceanic, polar and remote regions,³¹ consistent with Inmarsat's request, the ICAO SARPs and the FAA's Technical

²² Letter to Michael R. Deutschman, Chief Counsel and Chief Administrative Officer, Iridium, from the Acting Chief, Satellite Division (July 25, 2005).

²³ Attachment 1 to Application Amendment SAT-AMD-20050816-00160.

²⁴ Letter to the FCC Secretary from Donna Bethea Murphy, Vice President for Regulatory Engineering, Iridium, filed Dec. 13, 2011 in IBFS SAT-MOD-19961204-00139 ("Iridium December 2011 Letter").

²⁵ *Id.*, citing TSO-C159a, effective June 30, 2010.

²⁶ Iridium December 2011 Letter at 3. *See also* FAA presentation to the Cross Polar Working Group meeting of 7-10 June 2011, "FANS-1A Over Iridium and Performance Based Communications Concept," available at:

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/documents/cross_polar/CPWG11/FOI-CPWG_WP.ppt (last visited Jan. 24, 2013).

²⁷ Policy Branch Information, Satellite Space Applications Accepted for Filing, Report No. SAT-00828 (Dec. 16, 2011).

²⁸ Comments of Globalstar, Inc. filed Jan. 11, 2012.

²⁹ Letter to the FCC Secretary dated Jan. 11, 2012 from Diane Cornell, Vice President, Government Affairs ("Inmarsat Comments"). Inmarsat operates an MSS system in portions of the 1626.5-1660.5 MHz MSS uplink band.

³⁰ Letter to the FCC Secretary dated Dec. 29, 2011 from Joe Burns, Managing Director Technology and Flight Test, United Airlines ("United Airlines Comments"); letter to the FCC Secretary dated Jan. 10, 2012 from Capt. Ken Rewick, Vice President for Flight Operations, Hawaiian Airlines ("Hawaiian Airlines Comments"); letter to the FCC Secretary dated Jan. 12, 2012 from Steve Dickson, Senior Vice President – Flight Operations, Delta Air Lines ("Delta Air Lines Comments").

³¹ For purposes of this authorization, we consider oceanic regions to be those beyond 12 nautical miles from the baselines of the coastal states. *See* Presidential Proclamation No. 5928, 54 Fed. Reg. 777 (1988); U.N. Convention on the Law of the Sea, 21 I.L.M. 1261, at Part II, Art. 2 (opened for signature 1982). We consider "polar" regions to be those north of the Arctic Circle (66° 33' 44" N. Lat.), south of the Antarctic Circle (66° 33' 44" S. Lat.), and the Antarctic land masses and adjacent waters north of the Antarctic Circle. We do not define the term "remote areas"

(continued...)

Standard Orders.³² According to the applicant and the air carriers, it is in these regions that the need is greatest.³³ In the event additional work by ICAO and airspace authorities results in revised SARPs and other standards that make possible additional expansion of the use of Iridium's AMS(R)S, Iridium may seek a license modification.

11. *Foreclosing Claims of "Super-primary" Status for Iridium AMS(R)S.* We will also condition this grant, as requested by Inmarsat,³⁴ AMSC, and Globalstar, to make clear that grant of this application does not and should not be construed to require new restrictions on already licensed operations of earth stations in adjacent frequency bands. These parties observe that hundreds of millions of dollars have been invested in installation of adjacent-band earth stations, some operating in recognized safety services, and others performing significant safety-related functions.³⁵ These parties consequently urge that it would disserve the public interest to require expensive modification of such equipment to afford new protection for Iridium AMS(R)S.³⁶ We agree. We therefore condition the authority granted herein on a stipulation that any additional protection from interference from previously-authorized MSS operations in adjacent frequency bands, beyond that afforded by current arrangements, must be sought and obtained through inter-operator arrangements. In the event Iridium seeks any such additional protection without having in place an inter-operator arrangement, its request will be considered premature and inconsistent with the requirements of this license.³⁷

12. *Status of ITU Coordination.* Iridium's use of the AMS(R)S allocation is subject to provisions in the International Telecommunication Union (ITU) Radio Regulations that specify an agreement seeking process, including coordination with any affected administrations, prior to bringing the assignment into use.³⁸ The Commission has submitted on behalf of Iridium the appropriate filing to the ITU, but is in the early stages of the agreement seeking process. This license, therefore, is conditioned to require that Iridium not provide AMS(R)S in territories for which it has not successfully completed the agreement seeking process.

13. *Priority and Preemptive Access.* The FCC has consistently required that AMS(R)S providers give priority to safety messages, and design and operate their systems with the capability for real-time pre-emption of non-safety-related traffic in the event capacity is required for safety messages. We see no reason to take a different approach in this case, and therefore condition this license accordingly.

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as this is a term appropriate for individual countries and airspace authorities to define based on the particular circumstances, such as availability of traditional ground-based VHF infrastructure, within their territory or area of responsibility. Iridium's AMS(R)S will be subject to the specific constraints imposed by such countries and airspace authorities, and we condition this authorization accordingly. See ¶ 16.d. *infra*.

³² As Inmarsat correctly observes, the ICAO and FAA standards are premised on Iridium terminals operating in an interference environment suitable for their operations such as oceanic airspace, and neither ICAO nor the FAA has made a favorable finding concerning Iridium AMS(R)S operations in the more unfavorable interference environment of more intensively used airspace. Inmarsat Comments at 2.

³³ Iridium December 2011 Letter at 2; United Airlines Comments at 2; Delta Air Lines Comments at 1; Hawaiian Airlines Comments at 2.

³⁴ *Id.* at 3.

³⁵ These services include AMS(R)S, maritime safety applications, and 911 access.

³⁶ Comments of Globalstar, Inc. filed Jan. 11, 2012, at 2-3.

³⁷ See 47 C.F.R. § 1.401(e) (dismissal of petitions for rule making that are premature); 47 C.F.R. § 25.112(a)(2) (dismissal of defective applications).

³⁸ ITU Radio Regulations, Articles 5.367 and 9.21, Edition 2012.

14. *Scope of the Grant.* Our action today does not grant a license for AMS(R)S earth stations.³⁹ Iridium will need to file an application to modify its earth station licenses, and that application must be granted before commencement of AMS(R)S operations in the United States and on U.S. commercial aircraft. We anticipate that this request will be filed in the form of a blanket earth station authorization under Part 25 of the Commission's rules.⁴⁰

IV. CONCLUSION AND ORDERING CLAUSES

15. We conclude that a grant of this application would serve the public interest by providing enhanced options for safety communications with aircraft in areas in which such communications are currently unavailable or limited.

16. Accordingly, IT IS ORDERED that the application of Iridium Constellation LLC for modification of the Iridium space-station license to include authority for AMS(R)S, IBFS File No. SAT-MOD-19961204-00139, as amended by SAT-AMD-20050816-00160, IS GRANTED for operations in oceanic, polar, and remote regions, subject to the following conditions:

- a. AMS(R)S operations shall be confined to the 1618.725-1626.5 MHz frequency band;
- b. AMS(R)S operations shall comply with MSS coordination agreements with other MSS operators, the results of the agreement seeking process under ITU Radio Regulation 9.21, and coordination agreements with operators of radio astronomy observatories;
- c. Any additional protection desired for AMS(R)S operations from interference from previously authorized MSS operations in adjacent frequency bands, beyond that afforded by existing arrangements, must be sought through new or modified inter-operator arrangements;
- d. In connection with the provision of AMS(R)S to aircraft of any particular country of registry or in any particular airspace, Iridium is obliged to comply with the applicable laws, regulation, rules and licensing procedures of that country and/or the relevant airspace administrator.
- e. Iridium must limit AMS(R)S operations outside the United States to the oceanic regions, the Antarctic land mass and adjacent waters, and the remote areas of those territories for which it has successfully completed the agreement seeking process pursuant to ITU Radio Regulation 5.367.
- f. Iridium shall give priority to AMS(R)S and 911 safety messages, by real-time pre-emption if necessary, over all Iridium message traffic that is not considered safety-related pursuant to a recognized safety service..

17. IT IS FURTHER ORDERED that the amendment proposing modification of the Iridium orbital debris mitigation plan, IBFS File No. SAT-AMD-20051118-00236, IS DISMISSED and that the

³⁹ Inmarsat's request for a warning concerning installation of both Inmarsat and Iridium earth stations in the same aircraft can be addressed, to the extent necessary, in connection with earth station licensing. See Inmarsat Comments at 4.

⁴⁰ See *In the Matter of 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, Report and Order, FCC 12-161 (released Dec. 28, 2012) (declining to include additional satellite frequency bands in Part 87 aeronautical rules and indicating that AMS(R)S can be licensed under Part 25 on a case-by-case basis); see also *Review of Part 87 of the Commission's Rules Concerning the Aviation Radio Service*, WT Docket No. 01-289, Third Report and Order, 25 FCC Rcd 7610 (2010) at n.4 (transferring the record concerning addition to Part 87 of satellite bands to IB Docket No. 05-20). Given the limits on the scope of Iridium's AMS(R)S operations, licensing under the Part 25 case-by-case approach appears appropriate.

petitions to deny filed by L/Q Licensee, Inc., TRW Inc., Mobile Communications Holdings, Inc., and AMSC Subsidiary Corporation ARE GRANTED to the extent indicated herein and ARE OTHERWISE DENIED.

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

FEDERAL COMMUNICATIONS COMMISSION



Mindel De La Torre
Chief, International Bureau