Exhibit A
Legal Narrative and Response to Questions 35 and 42
Section 25.137 Showing; Waiver of the Rules

Inmarsat Mobile Networks, Inc. ("Inmarsat Mobile Networks" and, together with its affiliates, "Inmarsat") seeks blanket authority to operate six different types of Earth stations mounted on-board ships to communicate with the Inmarsat-5 F3 ("I5F3") satellite at the nominal 180° E.L. orbital location, which will be launched and operated under the authority of the United Kingdom. Inmarsat seeks authority in this application for these terminals to transmit in the 29.5-30.0 GHz band segment and receive in the 19.7-20.2 GHz band segment. Because this spacecraft has not previously been approved for service to the United States, this application provides the requisite market access information pursuant to Section 25.137 of the Commission's rules and the Commission's *Space Station Licensing Reform Order*.[1]

The technical information provided in this application is virtually identical to that provided in a pending application by an affiliate of ISAT US Inc. for authority to use the same six maritime antenna types to communicate with the Inmarsat-5 F2 satellite at the nominal 55º W.L. orbital location.[2]

I. SERVICE DESCRIPTION AND PUBLIC INTEREST STATEMENT

Inmarsat is a leading provider of satellite services, and operates a global fleet of spacecraft, including some of the most advanced commercial communications satellites now in orbit. Examples of the users that rely on Inmarsat services for their critical communications needs include the U.S. military, the Federal Aviation Administration, Department of Homeland Security (including the Federal Emergency Management Agency (FEMA) and the Coast Guard), U.S. Executive Branch officials, the New York City Fire Department, CNN, ABC, CBS, National Public Radio, the Red Cross, and nearly every major airline and shipping line throughout the world.

Inmarsat is deploying a global fleet of geostationary orbit ("GSO") Fixed Satellite Service ("FSS") satellites operating in the Ka band, including the Inmarsat-5 F3 ("I5F3") satellite that will operate at the nominal 180º E.L. orbital location, to provide global network coverage. The first two of these satellites have been successfully launched, and I5F3 is expected to be launched in the second quarter of 2015. All capacity on I5F3 will be made available to Inmarsat's direct customers (including Inmarsat affiliates) through individually negotiated contracts on a non-common carrier basis. These customers may, in turn, will use this capacity to serve end users on such terms and conditions as the customers may establish.

With the launch of I5F3, Inmarsat's Global Xpress ("GX") satellite technology will offer seamless global broadband communications on land, sea and in the air using state-of-the-art satellite and earth station technologies. GX is designed to respond to the exponentially increasing demand for satellite-delivered broadband high-speed data services.

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1 S*ee Amendment of the Commission's Space Station Licensing Rules and Policies*, First Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 10760, at ¶ 294 (2003) ("*Space Station Licensing Reform Order*").

2 *See* ISAT US, Inc. Applications, IBFS File Nos. SES-LIC-20140224-00098, SES-AMD-20140715-00601, SES-AMD-20150211-00073, Call Sign E140029 (accepted for filing public notices Jan. 28, 2015 and Mar. 4, 2015).

The GX system will support the provision of affordable high-data rate communications services, including broadband Internet access and related applications, through Earth stations that operate at fixed locations and Earth stations in motion mounted on ships, aircraft and vehicles worldwide.

Maritime communications through the GX network will be a highly integrated global offering of capabilities tailored to the needs of maritime users. This service complements Inmarsat's longstanding commitment to and experience with servicing maritime customers on a global basis through its existing global L-band satellite network. The GX offerings will bring a high level of value to various customers, including:

- Enhanced safety, security and cost-savings features: video monitoring, access to real-time weather and updated navigation charts;

- Ship management: extending state-of-the-art IT features and functions to ships at sea, including monitoring of cargo and mechanical functions, online access to customs and port documentation, and access to the same level of connectivity to enterprise networks as enjoyed by land-based users; and

- Crew welfare: efficient and reliable voice and Internet browsing, training, and interaction with shore facilities.

The technology and services offered by GX will stimulate growth, create jobs, and strengthen the economy by enabling companies to compete more efficiently in the global market. Thus, grant of this application and the requested market access will help further the Commission's goals of enhancing competition and promoting the growth and development of cost-effective satellite service, while also serving the goals of the National Broadband Plan.

II. EARTH STATION TERMINALS

In this application, Inmarsat Mobile Networks seeks a blanket license to operate stabilized Earth stations that will be mounted on ships to provide maritime communications ("GX Terminals") on U.S.-flagged ships through the GX network. This application seeks authority to operate these Earth stations to transmit in the 29.5-30.0 GHz band and to receive in the 19.7-20.2 GHz band through the I5F3 satellite at the nominal 180° W.L. location in order to provide broadband service.[3] This application does not seek authority to provide direct-to-home ("DTH") video or audio services, as defined by the Commission.

A. Area of Operations

The area of operations of the proposed GX Terminals will be U.S. and international waters, including inland waterways within the five-degree coverage contour of the satellite depicted by the red line in Figure 1 below.

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[3] These earth stations are also capable of operating in the 29.0-29.5 GHz (space-to-Earth) and 19.2-19.7 GHz (space-to-Earth) band segments; authority to operate in those band segments is not sought in this application.

FIGURE 1

Global Xpress I5 F3 Satellite Coverage
(5-degree contour in red; 0-degree contour in blue)

B. Earth Stations on Foreign-Registered Ships

The same maritime Earth station terminal types for which authority is sought in this application also will operate on foreign-registered maritime vessels in U.S. territorial waters, under the licensing authority of other administrations. Those foreign-licensed Earth stations will operate within the same network parameters, including band segments, operational control mechanisms, technical parameters and otherwise subject to the same conditions designed to ensure non-harmful-interference operations with the FSS as the U.S.-licensed Earth stations on U.S.-registered maritime vessels for which authority is sought in this application.

Inmarsat recognizes that transmissions from a foreign-flagged ship "while the same is within the jurisdiction of the United States" are required to be "in accordance with such regulations designed to prevent interference as may be promulgated under the authority of this Act."[4] The Inmarsat network will control the operation of these Earth stations on foreign-registered vessels while in U.S. territorial waters in the same manner as it will control the Earth stations operated on U.S.-registered ships.

Inmarsat also recognizes that the Commission previously has considered maritime Earth station operations in other parts of the Ka band on foreign-registered vessels located in U.S. territorial waters as requiring a waiver of the U.S. Table of Frequency Allocations and the Commission's Ka-band plan. To the extent necessary, and as discussed in more detail below, Inmarsat Mobile Networks seeks such a waiver with respect to the operations of these six maritime terminal types in the specified band segments while communicating with I5F3, (i) in the case of U.S.-registered vessels wherever located, and (ii) in the case of foreign-registered vessels while operating in U.S. territorial waters.

C. U.S. Frequency Allocation and Waiver Request

The frequency bands requested in this application are subject to the U.S. Table of Frequency Allocations in Section 2.106 of the Commission's rules ("U.S. Table") and the Ka-band Plan adopted by the Commission. The FCC's Ka-band plan designates the 19.7-20.2 GHz band and the 29.5-30.0 GHz band to the GSO FSS on a primary basis.[5] While the GX Terminals at times will be operated at fixed locations, they also will operate while moving. While operating at fixed locations, the Earth stations are consistent with the parameters of Section 25.138, as discussed in more detail below, and thus, are entitled to primary status.

At the time the Ka-band plan was adopted, the Commission anticipated authorizing mobile satellite use of the 19.7-20.2 GHz and 29.5-30.0 GHz band segments at such time as technology allowed both mobile satellite and fixed satellite uses to coexist in a manner consistent with the Commission's two-degree-orbital spacing policy.[6] Since that time, the Commission has determined that today's earth station technology allows mobile satellite uses to occur in a manner that is compatible with fixed satellite operations and has adopted rules for mobile satellite use of the C- and Ku- frequency bands.[7] The same technology that is

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4 47 U.S.C. § 306.

5 *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order, 11 FCC Rcd 19005 ¶¶ 42, 77 (1996) ("*28 GHz First Report and Order*").

6 *28 GHz First Report and Order* at ¶¶ 84-85.

7 *See ESV Order*; *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*, 24 FCC Rcd 10414 (2009) ("*VMES Order*"); *Revisions to Parts 2 and 25 of the Commission's Rules to Govern the Use of Earth Stations Aboard Aircraft Communicating with Fixed-Satellite Service Geostationary-Orbit Space Stations*

used in the C- and Ku-bands is being deployed in the GX Terminals under consideration in this application. When operating while on a moving platform, the GX Terminals will protect FSS operations of GSO satellites and NGSO systems consistent with the requirements of Section 25.138, just as they would if they were operating while stationary.[8]

For these reasons, and to the extent necessary, Inmarsat Mobile Networks seeks authority to operate the GX Terminals on a non-conforming, non-interference basis through waivers of the U.S. Table.[9] The Commission has granted waivers for non-conforming spectrum uses where a demonstration is made that the non-conforming operations would not likely cause harmful interference into the services allocated in Section 2.106 and where the non-conforming operator accepts any interference from conforming spectrum users.[10] The Commission granted a similar waiver to ViaSat to operate an Earth station on aircraft in the bands requested in this application.[11]

"Good cause" exists for the Commission to grant the requested waivers because such grant "would better serve the public interest than strict adherence to the general rule."[12] In particular, the requested waivers would facilitate users' ability to have access to new and innovative high data-rate communications services, including broadband Internet access, as well as multimedia, voice, and other data applications aboard maritime vessels and in areas that are currently underserved. Grant of the requested waivers also will allow Inmarsat to introduce advanced satellite technologies to U.S. users consistent with the Commission's

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Operating in the 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and 14.0-14.5 GHz Frequency Bands, 27 FCC Rcd 16510 (2012) ("*ESAA Order*").

8 The Earth stations in this application employ multi-axis directional antennas that are stabilized with the very latest technology. These antennas are typical fixed Earth stations that have been mounted on platforms that can move to provide the same communications services as the public expects at fixed locations. From a technical perspective, these Earth stations behave as if they were fixed Earth stations from an interference perspective with respect to other satellite networks. Because of network controls and monitoring, some of these Earth stations may operate with greater levels of protection toward other networks than traditional fixed Earth stations that can be operate while mis-pointed and without central network awareness.

9 In this application, Inmarsat Mobile Networks seeks a waiver to the extent necessary rather than a determination that the proposed operation of the GX Terminals properly is treated as an application of the FSS. *Cf.* ISAT US, Inc. Application, IBFS File No. SES-LIC-20140224-00098, Exhibit A at 4-5 (filed Feb. 14, 2014) (seeking authority for maritime mobile terminals communicating with the I5F2 satellite located at the nominal 55º W.L. orbital location). The vast majority of the coverage area of the I5F3 satellite is outside of Region 2, and the ITU Radio Regulation allocations are different in Region 3 for 19.7-20.2 GHz and 29.5-30.0 GHz band segments.

10 *See, e.g., Fugro-Chance, Inc.*, 10 FCC Rcd 2860 ¶ 2 (1995) (waiver of the U.S. Table of Frequency Allocations appropriate "when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services.").

11 *See* ViaSat Ka band Aeronautical Authorization, IBFS File No. SES-LIC-20120427-00404, Call Sign E120075 (granted July 17, 2013).

12 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

objectives of maximizing spectrum deployment for the benefit of the public. This will facilitate the provision of service to maritime users who will benefit from global availability of the GX service, such as commercial shipping crews, cruise ship passengers, and government users. At the same time, grant of the requested waivers will "not undermine the policy objective of the rule in question and would otherwise serve the public interest."[13] As explained below, the operation of the GX Terminals will not cause harmful interference to other authorized operations in these bands.

D. Technical Compatibility with Other Users in the Bands

This application includes the following Earth station terminal types that will be mounted on ships to provide maritime communications through the GX network:[14]

- Sea Tel model 4012GX (1 meter diameter)
- Sea Tel model GX60 (0.65 meter diameter)
- Japan Radio Company, Limited ("JRC") model JUE 60GX (0.65 meter diameter)
- Cobham Sea Tel model Sailor 100 GX (1.03 meter diameter)
- Intellian GX60 (0.65 meter diameter)
- Intellian GX100 (1.03 meter diameter)

Each of the Earth station terminals consists of a stabilized antenna and relevant electronics enclosed in a protective radome designed for operation aboard vessels.

1. Antenna Performance

The transmissions from each of these mobile Earth station terminal types will be consistent with the off-axis EIRP spectral density levels set forth in Section 25.138. Exhibit B contains the EIRP spectral density plots for each of the antennas. For blanket licensing of transmitting Earth stations in the 29.5-30.0 GHz band, the Commission adopted off-axis EIRP spectral density levels contained in Section 25.138(a). As shown in Exhibit B, each of the Earth station terminal types will operate within these levels under clear sky conditions and will not present any greater interference risk than any other Earth stations that meet these levels. In addition, the power flux-density at the Earth's surface produced by emissions from the I5F3 satellite when communicating with the GX Terminals will be within the -118 dBW/m^2/MHz limit set forth in Section 25.138(a)(6).[15]

The Commission adopted Section 25.138(e) for protection of receive Earth stations in the 19.7-20.2 GHz band from adjacent satellite interference based on the pattern specified in Section 25.209(a) and (b) or the actual receiving earth station antenna performance. As shown in Exhibit B, the Sea Tel 4012GX (1.0 meter) and the Intellian GX100 (1.03 meter) meet the Section 25.209(a) and (b) antenna patterns at all off-axis angles. In the case of the other four antennas, the antenna patterns do not meet Section 25.209(a) and (b) at all off-axis

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13 *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1166 (D.C. Cir. 1990).

14 *See* ISAT US, Inc. Applications, IBFS File Nos. SES-LIC-20140224-00098, SES-AMD-20140715-00601, SES-AMD-20150211-00073, Call Sign E140029 (accepted for filing public notices Jan. 28, 2015; Mar. 4, 2015).

15 *See infra*, Section III.A.2.

angles. Inmarsat Mobile Networks acknowledges the exceedances in the receive pattern and understands and agrees to accept interference by adjacent FSS satellite networks to the extent the receiving antenna performance requirements of Section 25.209 are exceeded when the terminals are operated in a fixed application. When the terminals are in motion, Inmarsat Mobile Networks is seeking to operate on a non-interference basis.

2. Antenna Pattern Waiver Requests

Inmarsat Mobile Networks requests limited waivers, to the extent necessary, of Section 25.138(d) relating to the antenna pattern information provided for certain of the antenna types:

Sea Tel 4012GX and Sea Tel GX60 Terminals. The antenna pattern diagrams for each of the Sea Tel 4012GX and Sea Tel GX60 antenna types are provided at the top and bottom of the 29.5-30.0 GHz and 19.7-20.2 GHz band segments. Although this application covers only the 29.5-30.0 GHz and 19.7-20.2 GHz band segments, the proposed Earth stations are capable of transmitting in the 29.0-30.0 GHz band segment and receiving in the 19.2-20.2 GHz band segment. Therefore, the manufacturer produced antenna patterns pursuant to Section 25.138(d) taking into account the entire range of the antennas (*i.e.*, the patterns made available to Inmarsat are for the lower, middle and upper points of the 29.0-30 GHz and 19.2-20.2 GHz band segments). To the extent necessary, Inmarsat Mobile Networks requests a limited waiver of Sections 25.138(d) to permit the submission of antenna patterns at the top and bottom of the frequencies covered by this application.[16] There is good cause for the Commission to grant this waiver, and such a grant will not undermine the policy objectives of the rule in question. The patterns show little variation between the lower and upper range of the 500 megahertz covered by this application. Given the relatively narrow range of frequencies, the patterns provided in this application are sufficient for the Commission to establish conformity with the off-axis EIRP spectral density limits throughout the range of the requested spectrum.

Cobham Sailor 100 GX. The antenna patterns provided in Exhibit B for the Cobham Sailor 100GX antenna type include the measured cross-polarization elevation EIRP spectral density data for this terminal for 0 to 10 degrees, and the pattern meets the Commission's rule with a minimum margin of 0.9 dB. The Commission's rule Section 25.138(d)(1)(ii) requires measured cross-polarization data from -10 degrees to +10 degrees, therefore to the extent necessary, Inmarsat Mobile Networks seeks a waiver of Section 25.138(d)(1)(ii) to allow Inmarsat Mobile Networks to provide measured data only for the 0 to 10 degree range. The Cobham Sailor 100 GX antenna is a symmetrical design and utilizes a feed located in the center of the reflector that results in relatively symmetrical antenna patterns around the boresight of the antenna. This symmetry is demonstrated in the other patterns provided in Exhibit B, and therefore it is expected that the cross-polarization elevation EIRP spectral density data for this terminal for -10 to 0 degree pattern will meet the Commission's rule consistent with the 0 to 10 degree pattern. Since the patterns for this earth station are relatively symmetrical and antenna measurements for the 0 to 10 degree pattern show that the

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[16] 47 C.F.R. § 25.138(d)(1) ("the applicant must provide, for each earth station antenna type, a series of radiation patterns measured on a production antenna. The measurements must be performed on a calibrated antenna range and, as a minimum, shall be made at the bottom, middle, and top frequencies of each requested uplink band").

Commission requirements in Section 25.138(a) will be met and thus adjacent operations will be adequately protected.

E. Additional Capabilities

The GX Terminals have been designed to operate in a dynamic environment, *i.e.* while in motion, and are capable of operating in a two-degree spaced GSO FSS environment. The minimum elevation angle required for transmission from these terminals is five degrees. As illustrated in Figure 4 below, the orientation of the antenna is controlled by two mechanisms. The first is a multi-directional stabilized platform that detects pitch, roll and yaw angles of the platform the antenna is installed on and adjusts the azimuth and elevation of the antenna to compensate for the relative movement of the platform. The second is an RF closed-loop tracking technique that employs an algorithm that minimizes the pointing error by analyzing a pre-determined signal received from the wanted satellite. The RF closed-loop automatic tracking technique adjusts, in successive steps, the antenna pointing by maximizing the strength of a reference signal or a carrier transmitted by the I5F3 satellite. This signal also ensures that the GX Terminal will not track another satellite. Furthermore, the GX Terminals are designed to inhibit transmissions if the reference signal is not properly received and decoded.

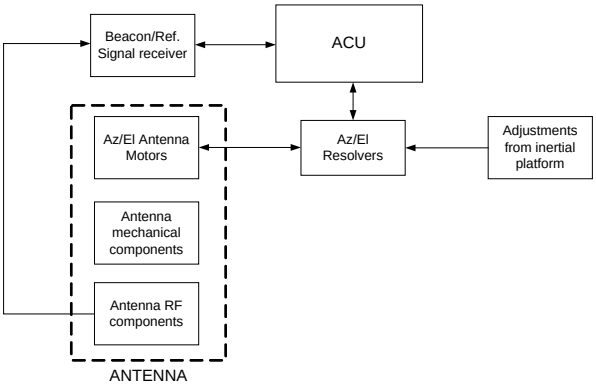

FIGURE 4[17]

The result of employing these mechanisms is a very high pointing accuracy in the direction of the wanted satellite. The high level of pointing accuracy results in a maximum pointing error of less than or equal to 0.2 degrees for each of the antenna types. As an additional layer of protection for adjacent satellite networks, each of the Earth stations is designed to inhibit any transmission when mis-pointed by more than 0.5 degrees within 100ms and not to resume transmissions until the mis-pointing angle to the wanted satellite is less than or equal to 0.2 degrees. Inmarsat Mobile Networks provides as Exhibit F declarations from each of the antenna manufacturers regarding the pointing accuracy of each of their respective antennas included in this application.

Inmarsat will maintain a point of contact in the U.S. available 24/7 with the authority and ability to cause the cessation of transmissions from the GX Terminals. Inmarsat's Network Operations Center (NOC) located in London, in the United Kingdom. The U.S. point of contact will be able to direct the NOC to transmit "enable transmission" or "disable

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[17] ACU in Figure 4 is the Antenna Control Unit.

transmission" commands for reception by the GX Terminals. The GX Terminals will cease transmission after reception of a "parameter change" command from the NOC. The NOC generally will monitor the GX Terminals to ensure that operations are within the prescribed operational parameters and Inmarsat personnel will be available to address any claims on interference from the GX Terminal operations.

For each GX Terminal, a record of the ship location (*i.e.*, latitude/longitude), transmit frequency, channel bandwidth and satellite used will be recorded and maintained for a period of no less than one year. This information will be recorded at time intervals no greater than 20 minutes while the Earth station is transmitting. Inmarsat will be able to make this data available to the Commission promptly upon request.

III. SATELLITE INFORMATION

A. DISCO II Showing – Section 25.137(a)

I5F3 will operate under the authority of the United Kingdom.[18] Consequently, the Commission's *DISCO II* framework applies to this application.[19] The *DISCO II* analysis includes consideration of a number of factors, such as the effect on competition in the United States, spectrum availability, eligibility requirements, technical requirements, national

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[18] The United Kingdom has submitted on behalf of Inmarsat an ITU filing under the filing name INMARSAT-KA 180E, as published by the ITU on May 3, 2011 (date of receipt Feb. 6, 2011). *See* Ofcom Letter, attached as Exhibit H. This United Kingdom ITU filing covers frequency bands for which authority is sought in this application, as well as portions of the C-band and the 17.7-19.7 GHz, 27.5-29.5 GHz, 20.2-21.2 GHz and 30.0-31.0 GHz portions of the Ka band, for which authority is not sought in this application. Consistent with Commission precedent, Inmarsat is disclosing the ability of Inmarsat-5 F3 to operate in those band segments. Full technical details will be provided if and when Inmarsat or one of its commercial customers seeks authority for U.S. service using those additional frequencies. *See, e.g.*, Telesat Canada, IBFS File No. SAT-PPL-200605016-00061, at 1 n.2 (filed May 16, 2006; granted Jan. 18, 2007) (disclosing existence of Ka-band payload on Anik F3 but not seeking market access using the Ka-band payload and providing only technical information regarding the C- and Ku-band operations); *see also Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, Report and Order, 15 FCC Rcd 16127, ¶ 88 (2000) (providing that technical requirements in market access requests apply only to specific system components that operate in the United States, and not to system operations outside of the United States). Inmarsat has an application pending with the UK Space Agency for obtaining authority to operate this spacecraft under the United Kingdom Outer Space Act and, as is customary in the UK, Inmarsat expects such authority to be granted closer to the launch of the spacecraft. Sufficient ties with the United Kingdom exist to provide the UK Space Agency the basis for issuing an authorization, because of the procurement of the spacecraft's launch through an Inmarsat entity based in the UK, and because an Inmarsat-based UK company will be responsible for in-orbit activities.

[19] *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, 12 FCC Rcd 24094, at ¶¶ 30-49 (1997) ("*DISCO II*").

security, law enforcement, foreign policy and trade concerns.[20] Each of these factors weighs in favor of granting this application.

1. Effect on Competition in the United States

In *DISCO II*, the Commission established a rebuttable presumption that it will further competition in the United States to allow non-U.S. satellites authorized by WTO Members to provide services covered by the U.S. commitments under the WTO Basic Telecommunications Agreement.[21] The United Kingdom, the licensing administration for I5F3, is a WTO Member. Further, Inmarsat seeks to use the requested spectrum to provide satellite services that are covered by the WTO Basic Telecommunications Agreement.[22] Accordingly, the presumption in favor of entry applies to I5F3.

Allowing Inmarsat to serve the U.S. with I5F3 will help fulfill the promise of the WTO Basic Telecommunications Agreement with respect to satellite communications services. Grant of this application will enhance competition in the United States by facilitating the introduction of Inmarsat's satellite services, thereby stimulating lower rates, improving service quality, increasing service options, and fostering technological innovation. The Commission consistently has relied on these same public interest benefits in granting similar requests.[23]

2. Spectrum Availability and Allocations

As Inmarsat Mobile Networks demonstrates in the attached Technical Annex,[24] Inmarsat's proposal to serve the United States using I5F3 in the 19.7-20.2 GHz and 29.5-30.0 GHz band segments from the nominal 180° E.L. orbital location (i) is fully compliant with the Commission's two-degree spacing requirements, (ii) will not cause harmful interference to any other authorized user of the spectrum, and (iii) is compatible with future Ka-band FSS spectrum assignments at adjacent locations that are consistent with the Commission's rules. Among other things, the proposed communications over I5F3 will comply with the uplink off-axis EIRP density and downlink PFD levels specified in Section 25.138 of the Commission rules, and thus is deemed compatible with FSS satellite systems operating in these band segments. [25] Therefore, this request is fully consistent with the procedures set

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20 *See e.g., Telesat Canada, Petition for Declaratory Ruling for Inclusion of Anik F2 on the Permitted Space Station List, Petition for Declaratory Ruling to Serve the U.S. Market Using Ka-band Capacity on Anik F2*, Order, 17 FCC Rcd 25287, at ¶ 6 (2002).

21 *DISCO II* at ¶ 39; *see also* 47 C.F.R. § 25.137(a)(2).

22 This application does not seek authority to provide direct-to-home ("DTH") video or audio services, as defined by the Commission.

23 *See, e.g., Digital Broadband Applications Corp.*, 18 FCC Rcd 9455 (2003); *Pegasus Development Corp*., 19 FCC Rcd 6080 (2004); *DIRECTV Enterprises, LLC, Request for Special Temporary Authority for the DIRECTV 5 Satellite*, 19 FCC Rcd 15529 (2004).

24 *See* Attachment A, Technical Annex at 11.

25 47 C.F.R. § 25.138.

forth by the Commission in the *Space Station Licensing Reform Order* regarding the processing of GSO-like services.[26]

3. U.S. Government Coordination

Inmarsat will engage with the appropriate U.S. Government agencies and obtain the necessary coordination arrangements pursuant to application U.S. Table of Allocation footnotes. Specifically, Inmarsat will conduct US334 coordination with the applicable Federal users in advance of commencing operations.

4. National Security, Law Enforcement, and Public Safety Matters

Grant of this application is consistent with U.S. national security, law enforcement and public safety considerations. Inmarsat's operations in the United States are subject to a network security agreement between Inmarsat on the one hand and the U.S. Department of Justice and the Department of Homeland Security on the other, dated September 23, 2008, as amended (the "Agreement"). Pursuant to the terms of the Agreement, any FCC authorizations granted to Inmarsat must be conditioned on compliance with the terms of the Agreement. Inmarsat requests that the Commission adopt the following condition in granting this application:

> This authorization and any licenses related thereto are subject to compliance with the provisions of the Agreement between Inmarsat on the one hand and the U.S. Department of Justice (DOJ) and the Department of Homeland Security (DHS) on the other, dated September 23, 2008.

B. Legal and Technical Information – Section 25.137(b)

1. Legal Qualifications

Inmarsat's legal qualifications are set forth in this application and in the attached Form 312. In addition, this application, the associated Technical Annex, and the attached Form 312 demonstrate Inmarsat's satisfaction of the applicable requirements for space station applicants set forth in Section 25.114 of the Commission's rules.[27]

2. Technical Qualifications

Included with this application are a Technical Annex (including an orbital debris mitigation showing) and Schedule S for Inmarsat-5 F3 with the required Part 25 technical information. As discussed in further detail in the Technical Annex, in order to reduce the risk of in-orbit collisions with other satellites located at the same nominal location, Inmarsat proposes to operate at an offset location to eliminate any station-keeping volume overlap with other satellites.

The Technical Annex includes information concerning orbital debris mitigation. In the case of applications seeking U.S. market access via non-U.S.-licensed space stations, the Commission has concluded that the orbital debris requirement can be satisfied by showing

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[26] *See Space Station Licensing Reform Order* at ¶ 113.

[27] *See* 47 C.F.R. § 25.114.

that the satellite system's debris mitigation plans are subject to direct and effective regulatory oversight by the satellite system's national licensing authority.[28] The Commission has determined that this requirement may be satisfied by referencing an English language version of the debris mitigation rules or regulations of the national licensing authority and indicating the current status of the national licensing authority's review of its debris mitigation plans.[29]

The I5F3 satellite will be operated under the authority of the United Kingdom, and will be subject to the United Kingdom Outer Space Act 1986 ("Outer Space Act"). The Outer Space Act ensures compliance with the U.K.'s obligations under international treaties and principles covering the use of outer space and specifies that the U.K. licensing authority has the power to require licensees to conduct operations in such a manner as to "prevent the contamination of outer space," to "avoid any breach of the United Kingdom's international obligations," and to impose conditions "governing the disposal of the payload in outer space on the termination of operations under the license."[30] In addition, the UK Space Agency, the U.K. agency charged with licensing activities in outer space, including the launch and operation of space objects, has issued published guidance on the Outer Space Act requirements, which requires applications for a space activities license to provide information regarding the plans for disposal of the space object at the end of life, including whether the propellant and pressurant tanks are vented.[31] The UK Space Agency evaluates such applications pursuant to published standards, including the IADC Space Debris Mitigations Guidelines.

Inmarsat has submitted the application for launch and operating authority for filing with the UK Space Agency, which includes a description of the end-of-life plan for I5F3. Inmarsat submits that the foregoing demonstration of the U.K.'s authority over I5F3 provides direct and effective regulatory oversight regulation of the space activities of I5F3, and satisfies the requirements of Section 25.114(d)(14) and Section 25.283(c).

Given the direct and effective oversight of the U.K. over the space operations of I5F3, Inmarsat submits that the orbital debris requirements of the Commission's rules are satisfied.

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28 *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567 ¶¶ 94, 95 (2004) ("*Orbital Debris Second Report and Order*").

29 *Id.* at ¶ 95; *see also Globalstar Licensee LLC, GUSA Licensee LLC, GCL Licensee LLC*, Order, DA 11-520 ¶¶ 30-32 (rel. Mar. 18, 2011) (concluding that French Space Operations law and technical regulations provide for direct and effective regulation of debris mitigation measures by France, resulting in a finding that Globalstar satisfied its orbital debris mitigation showing); O3b Limited, IBFS File No. SES-LIC-20100723-00952, Call Sign E100088, Condition 90045 (granted Sept. 25, 2012) (determining that O3b's request for a waiver of Section 25.283(c) for unvented pressure vessels was unnecessary, finding that O3b is subject to direct and effective regulation by the United Kingdom concerning orbital debris mitigation) ("O3b Grant").

30 Outer Space Act 1986, 1986 Ch. 38, § 5(2)(e) (1986) (U.K.).

31 *See* Revised Guidance for Applicants, Outer Space Act 1986, Annex A, Section 1.3 available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/320158/Guidance_for_applicants_-_June_2014.pdf.

Out of an abundance of caution, Inmarsat notes that Section 12.2 of the Technical Annex includes an Accidental Explosion Assessment describing helium tanks that, consistent with the Boeing 702 bus design, will be used in apogee engine firings during transfer orbit, will be sealed at the end of transfer orbit and which are expected to maintain an extremely low final pressure at the end of life of the spacecraft. While Section 25.283(c) requires that a space station licensee "ensure . . . that all stored energy sources on board the satellite are discharged, by venting excess propellant, discharging batteries, relieving pressure vessels, and other appropriate measures,"[32] the Commission has determined where the satellite operator is subject to direct and effective regulation by another administration, a waiver of Section 25.283(c) for unvented pressure vessels is unnecessary.[33] To the extent necessary, Inmarsat respectfully seeks a waiver of Section 25.283(c) as it applies to the helium tanks on I5F3, given the direct and effective oversight of the U.K. and given that the very low pressure in the helium tanks at the satellite's end-of-life and their enclosure in the spacecraft body makes the potential for release of orbital debris extremely unlikely.

C. Additional Requirements – Section 25.137(d)

1. Milestones and Bond Requirement

Construction of I5F3 has been completed, and the satellite is slated for launch in the second quarter of 2015.[34] Inmarsat anticipates that the satellite will be launched by the time this application for market access is granted. Therefore, all milestones established in the *Satellite Licensing Reform Order* should have been met and no bond should be required.[35]

2. Spectrum Usage

Inmarsat has a pending market access request for the Ka band at the nominal 55º W.L. orbital location, which is the only pending or granted spectrum reservation request involving unbuilt spacecraft to which the limits of Section 25.137(d)(5) of the Commission's rules would apply.

3. Ownership Information

Inmarsat Mobile Networks, Inc., a Delaware corporation with its principal place of business in the United States, is wholly owned by Stratos Holdings, Inc., a Delaware corporation with its principal place of business in the United States. Stratos Holdings, Inc. is wholly owned by Inmarsat Group Holdings, Inc., a Delaware corporation with its principal place of business in the United States. Inmarsat Group Holdings, Inc. is wholly owned by

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32 47 C.F.R. § 25.283(c).

33 *See* O3b Grant, Condition 90045.

34 The contract for the construction of I5F3 is the same as the contract for I5F2 that was submitted as a supplement to Inmarsat's pending application for market access for I5F2. *See* Supplement to Application of Inmarsat Mobile Networks, Inc., IBFS File Nos. SES-LIC-20120426-00397, SES-AMD-20120823-00781; Request for Determination of Compliance with Satellite Implementation Milestones and Bond Reduction (filed Apr. 15, 2013).

35 *See* 47 C.F.R. § 25.137(d)(4); *see also Space Station Licensing Reform Order* at ¶ 311.

Inmarsat Solutions Ltd. Inmarsat Solutions Ltd. is wholly owned by Inmarsat Finance III Limited. Inmarsat Finance III Limited is wholly owned by Inmarsat Ventures Ltd., which is wholly owned by Inmarsat Investments Ltd. Inmarsat Investments Ltd. is wholly owned by Inmarsat Group Ltd. Inmarsat Group Ltd. is wholly owned by Inmarsat Holding Ltd. Inmarsat Holding Ltd. is wholly owned by Inmarsat plc. Information about the ownership and management of Inmarsat plc is on file with the Commission, and Inmarsat Mobile Networks, Inc. incorporates that information by reference.[36] With the exception of Inmarsat Mobile Networks, Inc., Stratos Holdings, Inc. and Inmarsat Group Holdings, Inc., each of the Inmarsat entities described above is formed under the laws of England and Wales and has its principal place of business in the United Kingdom.

The officers and directors of Inmarsat Mobile Networks, Inc. are as follows:

Name	Position(s)	Citizenship
Peter Hadinger	Director	United States
Bruce Henoch	Director and President	United States
Chris Murphy	Director	United States

Each of these officers and directors can be reached care of Inmarsat at 1101 Connecticut Avenue, NW, Suite 1200, Washington, DC 20036.

D. Waiver Pursuant to Section 304 of the Communications Act

In accordance with Section 304 of the Communications Act of 1934, as amended, Inmarsat hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise.

IV. CONCLUSION

For the foregoing reasons, granting this application for authority to operate maritime Earth stations and to access the U.S. market in the 19.7-20.2 GHz and 29.5-30.0 GHz band segments using a satellite operated under the authority of the United Kingdom at the nominal 180° E.L. orbital location will serve the public interest, convenience and necessity. Inmarsat Mobile Networks therefore respectfully requests that the Commission promptly grant this application.

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[36] *See* IBFS File No. SES-ASG-20141121-00871 (granted Dec. 2, 2014); IBFS File No. ISP-PDR-20090818-00006; ULS File No. 0004040346. *See also* IBFS File No. SES-LIC-20090217-00184 (granted Oct. 22, 2009), at Exhibit B (requesting a declaratory ruling that it would serve the public interest to allow up to 100 percent indirect non-U.S. ownership of Inmarsat Hawaii, Inc., the predecessor to Inmarsat Mobile Networks, Inc.).

Attachment A

TECHNICAL ANNEX

A.1 Scope and Purpose

The purpose of this Attachment is to provide the Commission with the salient technical characteristics of the Inmarsat-5 F3 satellite, as required by 47 C.F.R. §25.114 and other sections of the FCC's Part 25 rules, that cannot be captured by the Schedule S software.

A.2 General Description of Overall System Facilities, Operations and Services (§25.114(d)(1))

The Inmarsat-5 F3 satellite will operate at the nominal 180° E.L. orbital location and will provide fixed-satellite service ("FSS") to earth stations in the Pacific Ocean region (see coverage diagram in Figure A.2.1). The satellite will be operated at an offset location of 0.3 degrees from 180º E.L. to center the station-keeping box at 179.7º E.L. The satellite will operate in the 27.5-30.0 GHz band (Earth-to-space) and 17.7-20.2 GHz band (space-to-Earth) portions of the Ka band. The satellite network will employ two large gateway antennas and will provide service to widely-deployed, small user antennas.

The gateway antennas will be capable of communicating with the spacecraft throughout the 27.5-30.0 GHz and 17.7-20.2 GHz bands. One gateway antenna will be located in Auckland, New Zealand and the other one will be in Warkworth, New Zealand.

TT&C operations will be provided by one of these gateway earth stations. On-station TT&C transmissions will occur in the Ka band, and the spacecraft also will be capable of using C-band frequencies for TT&C during transfer orbit and for emergency purposes. Because the TT&C, feeder link frequencies and gateway antennas are not located in the United States, they are not the subject of this application.

This application seeks authority to serve the United States using only the 29.5-30.0 GHz and 19.7-20.2 GHz portions of the Ka band. In this band, the user antennas will operate within the "Global Payload Beams" or "GP Spot Beams" on the spacecraft. The Global Payload Beams operate in the 29.5-30.0 GHz and 19.7-20.2 GHz bands and consist of 89 contiguous, fixed spot beams. A representative depiction of the coverage of these beams is depicted in Figure A.2.1. A sample Global Payload Beam coverage pattern is shown in Figure A.2.2.

Figure A.2.1. Representative Global Payload Spot Beam Coverage

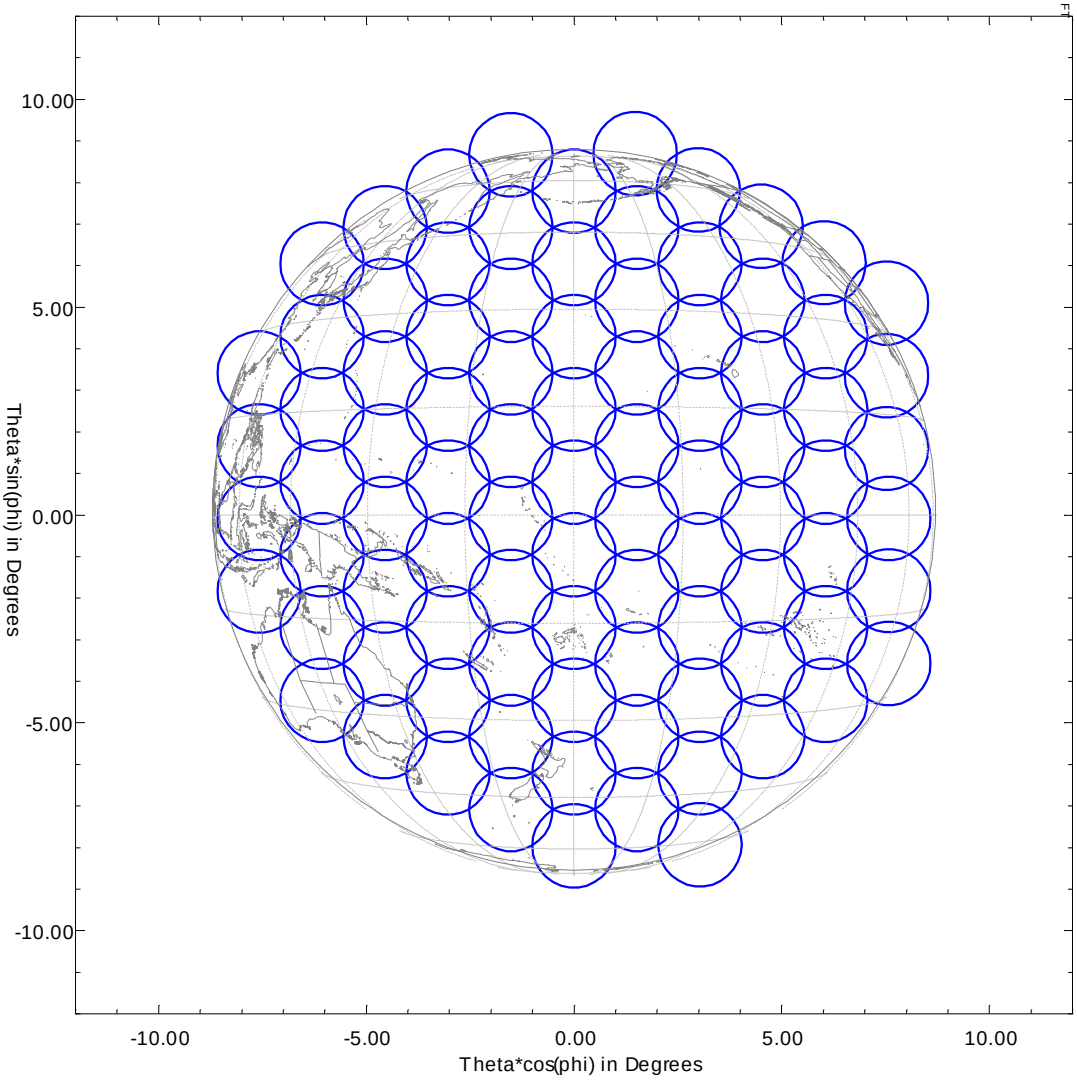
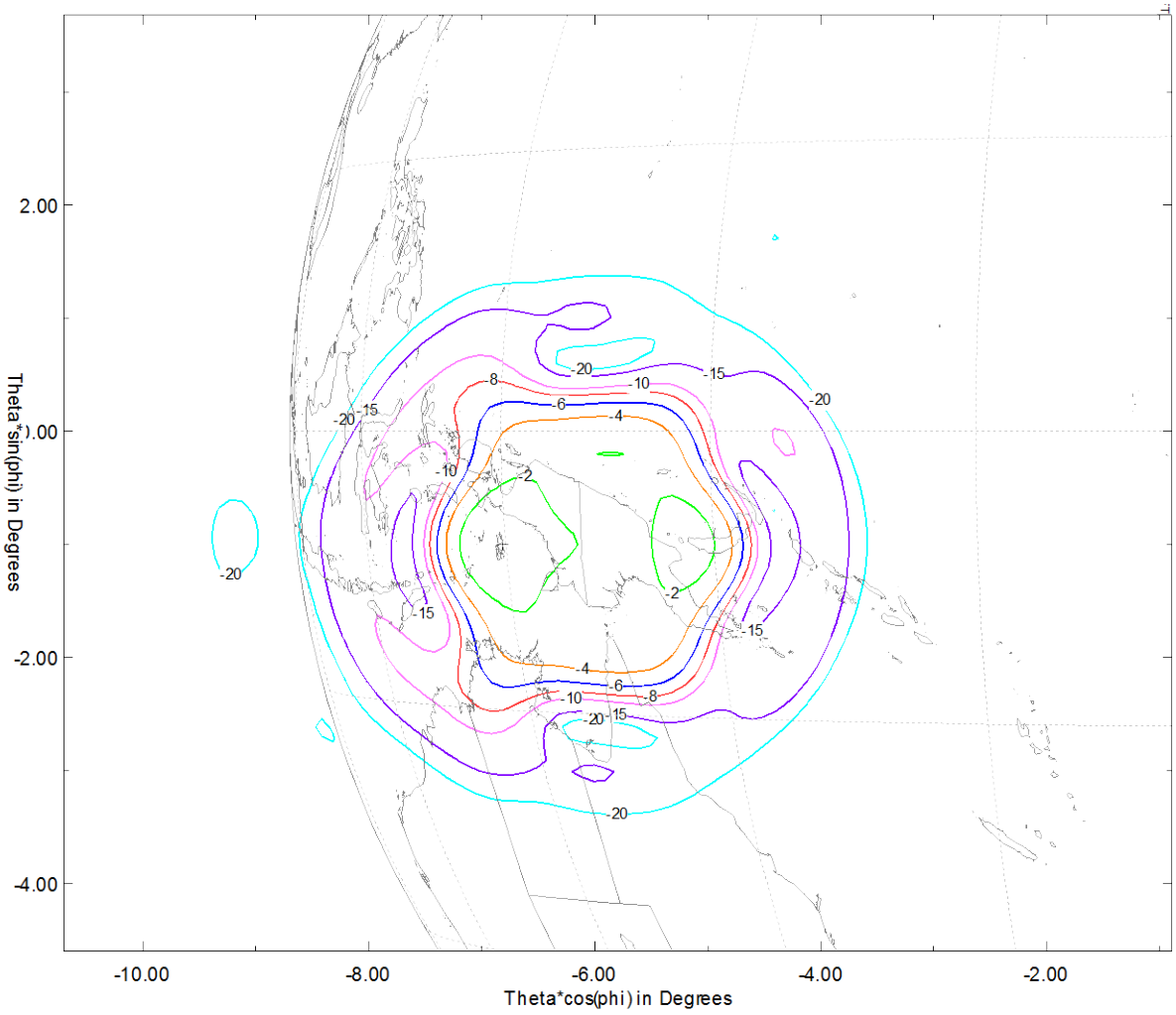


Figure A.2.2. Sample Global Payload Spot Beam Coverage Pattern



The spacecraft will be capable of operating in the 29.0-29.5 GHz and 19.2-19.7 GHz band segments for user terminals, but authority to operate user terminals in those band segments is not sought in this application. The spacecraft also will be capable of using C-band frequencies at 4199.0 MHz, 4199.5 MHz, 5926.5 MHz and 6422.5 MHz for TT&C during transfer orbit and for emergency purposes. Certain of the beams described above will be switchable to also enable communications in portions of the 20.2-21.2 GHz and 30.0-31.0 GHz bands, which are not allocated for commercial service in the United States. Operations in these bands would occur under the authority of Norway, pursuant to ITU filings submitted by the Norwegian Administration. Authority to serve the United States using the frequency segments described in this paragraph is not being requested in this application.

A.3 Predicted Space Station Antenna Gain Contours (§25.114(c)(vi))

The Inmarsat-5 F3 satellite antenna gain contours for the receive and transmit beams, as required by §25.114(d)(3), are given in GXT format in the GIMS container file included in this application.

A.4 Frequency and Polarization Plan (§25.114(c)(4)(i))

Details of the satellite's Ka-band frequency plan is provided in the associated Schedule S submission. The GP Spot Beams operate in RHCP on the uplink and LHCP on the downlink. Consistent with Section 25.210(f), the GP Spot Beams employ an average six-fold frequency re-use by spatial separation of co-frequency beams.

In the GP Spot Beams, 72 channels are available in the forward link direction and 72 are available in the return link direction, each with 40 MHz spacing and 32 MHz useful bandwidth. These 72 channels in each direction are allocated among the 89 GP Spot Beams, with two channels available in certain beams. The possible channel to beam allocation configurations in the GP Spot Beams are as shown below.

	Number of available channels	Number of GP Spot Beams	Number of channels per GP Spot Beam
	48 channels	48 beams	1 channel (fixed)/beam
	24 channels	12 beams	1 or 2 channels/beam
		29 beams	Up to 1 channel/beam
Total	72 channels	89 beams	

A.5 Transponder Configuration

The satellite has a total of 67 simultaneously active TWTAs, excluding TT&C functions. This consists of 61 active TWTAs in the forward link direction (gateway-to-user) and 6 active TWTAs in the return link direction (user-to-gateway).

Note that in the associated Schedule S the term "transponder" refers to the useful bandwidth of each channel (which is 32 MHz for the GP Spot Beams) and not to the number of active TWTAs.

A.6 Services to be Provided (§25.114(d)(1))

The Inmarsat-5 F3 satellite will provide a variety of two-way communications services to small user terminals including broadband Internet access, multimedia, voice and other applications.

Representative link budgets, which include details of the transmission characteristics, performance objectives and earth station characteristics, are provided in the associated Schedule S submission.

A.7 TT&C Characteristics (§25.114(c)(4)(i))

As noted above in Section A.2, on-station TT&C for Inmarsat-5 F3 will be provided by gateway earth stations located in New Zealand, and authority for TT&C is not being sought in this application.

A.8 Satellite Transponder Frequency Responses (§25.114(c)(4)(v))

The predicted receive and transmit channel filter response performance is given in Table A.8.1 below. The receive response is measured from the satellite receive antenna up to the input of the TWTA. The transmit response is measured from the input of the TWTA to the satellite transmit antenna.

Table A.8.1. GP Spot Beam Typical Receiver and Transmitter Filter Responses

Frequency offset from channel center	Gain relative to channel center frequency (dB)		Comments
	Receive	Transmit	
CF +/- 11.2 MHz	1	1	In-Band
CF +/- 12.8 MHz	1.3	1.3	Value does not exceed these p-p values
CF +/- 14.4 MHz	2	2	
CF +/- 16 MHz	3	3	
CF +/- 20.8 MHz	-1	-1	Out-of-Band
CF +/- 24 MHz	-10	-7	Attenuation is not less than these values
CF +/- 27.2 MHz	-25	-20	

A.9 Cessation of Emissions (§25.207)

All downlink transmissions can be turned on and off by ground telecommand, thereby causing cessation of emissions from the satellite, as required.

A.10 Power Flux Density at the Earth's Surface (§25.208(c))

§25.208 does not contain any PFD limits that apply in the 19.7-20.2 GHz band for GSO satellite networks, and it is noted also that Article 21 of the ITU Radio Regulations does not have any PFD limits that apply in this band.

A.11 Two Degree Compatibility (§25.138)

Transmissions in the Inmarsat-5 F3 satellite network in the 29.5-30.0 GHz and 19.7-20.2 GHz bands will not exceed the uplink off-axis EIRP density and downlink PFD levels of §25.138.

§25.138 of the Commission's rules defines the uplink and downlink parameters that permit routine blanket licensing of Ka-band earth stations in certain frequency bands which define the acceptable levels of adjacent satellite interference permitted in the Ka band by the FCC, absent specific coordination agreements with neighboring satellites.

For the 29.5-30.0 GHz and 19.7-20.2 GHz frequency bands, compliance with the Commission's two-degree spacing policy is ensured provided:

- The uplink off-axis EIRP density levels given in §25.138(a)(1) of the Commission's rules are not exceeded; and
- The maximum downlink PFD levels given in §25.138(a)(6) of the Commission's rules are not exceeded.

The clear sky uplink off-axis EIRP density limits of §25.138(a)(1) are equivalent to a maximum uplink input power density of -56.5 dBW/Hz for earth stations in compliance with off-axis transmit gain masks in §25.209(a)(2) and (4).

Table A.11.1 compares the uplink input power densities derived from the uplink link budgets that are contained in the Schedule S with the clear sky limits of §25.138 (a)(1). It can be seen that in all cases the clear sky uplink power limits are met.

Table A.11.1. Demonstration of Compliance with the Uplink Power limits of §25.138 (a)(1)

Uplink Antenna Diameter	Maximum Clear Sky Uplink Input Power Density (dBW/Hz)	Clear Sky Uplink Input Power Density Limit of §25.138 (a)(1) (dBW/Hz)	Margin (dB)
13.2m	-70.0 (*)	-56.5	13.5
Typical-60cm	-58.4	-56.5	1.9
Typical-100cm	-58.5	-56.5	2.0
Typical-150cm	-57.9	-56.5	1.4

(*) Note: The Schedule S link budgets show a maximum uplink power density of -67 dBW/Hz under faded condition from the 13.2 m antenna. Under clear sky condition the uplink power density will not exceed -70 dBW/Hz.

In the band 19.7-20.2 GHz, the maximum downlink EIRP density that the Inmarsat-5 F3 satellite will transmit is 56.1 dBW in an occupied bandwidth of 32 MHz. This translates into 41 dBW in 1 MHz. The shortest distance from the satellite to the Earth is 35,786 km, corresponding to a spreading loss of 162.06 dB. Therefore the maximum possible PFD at the Earth's surface at an elevation angle of 90° will not exceed -121.06 dBW/m^2 in 1 MHz (*i.e.*, 41 -162.06).

In summary, all downlink transmissions from the Inmarsat-5 F3 satellite will comply with the -118 dBW/m^2/MHz limit set forth in §25.138(a)(6) of the Commission's rules.

A.12 Orbital Debris Mitigation Plan (§25.114(d)(14))

Inmarsat has incorporated the material objectives of §25.114(d)(14) of the Commission's Rules into the design of the satellite through the satellite's Technical Specifications, Statement of Work and Test Plans. The Statement of Work includes provisions to review orbital debris mitigation, and compliance with §25.114(d)(14), as part of the preliminary design review ("PDR") and the critical design review ("CDR") and to incorporate its requirements, as appropriate, into its Test Plan, including a formal Failure Mode Verification Analysis ("FMVA") for orbital debris mitigation involving particularly the TT&C, propulsion and energy systems.

A.12.1 Spacecraft Hardware Design (§25.114(d)(14)(i))

The satellite is based on the heritage Boeing 702 HP flight proven platform.

Inmarsat will ensure that the satellite does not release any debris during its operation. Furthermore, all separation and deployment mechanisms, and any other potential source of debris will be retained by the spacecraft or launch vehicle.

In conjunction with the satellite manufacturer, Inmarsat has assessed and limited the probability of the satellite becoming a source of debris by collisions with small debris or meteoroids of less than one centimeter in diameter that could cause loss of control and prevent post-mission disposal. Inmarsat and the satellite manufacturer have taken steps to limit the effects of such collisions through shielding, the placement of components, and the use of redundant systems.

The Inmarsat-5 F3 satellite includes redundant TT&C and propulsion subsystems to ensure successful end-of-life disposal. The spacecraft TT&C system, vital for orbit raising, will be extremely rugged with regard to meteoroids smaller than 1 cm, by virtue of its redundancy, shielding, separation of components and physical characteristics. The TT&C subsystem will have no single points of failure. Near-omni-directional antenna coverage is provided through the use of a combination of independent bicone and forward/aft pipe antennas. These antenna feeds are extremely rugged and capable of providing adequate coverage even if struck, bent or otherwise damaged by a small or medium sized particle. The command receivers and decoders and telemetry encoders and transmitters will be located within a shielded area and will be totally redundant and physically separated. Two shielded xenon tanks and a redundant pairs of thrusters provide the energy for orbit-raising.

A.12.2 Accidental Explosion Assessment (§25.114(d)(14)(ii))

The Inmarsat-5 F3 satellite will be a Boeing 702HP model spacecraft, which is designed to minimize the potential for accidental explosions through propellant leakage and fuel and oxidizer mixing or other means. Propellant tanks and thrusters are isolated using redundant valves, and electrical power systems are shielded in accordance with standard industry practices. During the mission, batteries and various critical areas of the propulsion subsystem will be monitored to avoid conditions that could result in explosion. After the Boeing 702HP spacecraft reaches its final disposal orbit, all on-board sources of stored energy will be removed by depleting all propellant tanks, venting all (exception to helium as described below) pressurized systems, discharging batteries, and turning off all active units.

The Boeing 702HP spacecraft uses a bus that has a liquid propulsion system design consisting of two helium tanks plus two pairs of fuel and oxidizer tanks and uses a xenon ion propulsion system design consisting of two xenon tanks. Venting of the excess propellant in the fuel, oxidizer and xenon tanks is performed as part of the end-of-life shutdown operations. The helium tanks provide proper propellant tank pressurization for apogee engine firings during transfer orbit. Consistent with Boeing's practice with respect to a number of its spacecraft buses, both helium tanks are isolated at the end of transfer orbit by firing pyro-valves. The spacecraft's helium system will be sealed when tanks are isolated, resulting in a final pressure of ~230 psi, which is extremely low relative to the design burst pressure of 5250 psig (actual test performance

at 6660 psig). Due to the low pressure at end-of-life in the helium tanks and their enclosure in the spacecraft body, an explosive event is extremely unlikely (even in the event of a tank rupture, *e.g.*, a meteorite strike), minimizing the potential of any release of orbital debris. The xenon tanks are vented by opening latch valves downstream of the tanks to allow cold flow through the xenon ion thrusters.

A.12.3 Safe Flight Profiles (§25.114(d)(14)(iii))

In considering current and planned satellites that may have a station-keeping volume that overlaps the Inmarsat-5 F3 satellite, Inmarsat has reviewed the lists of FCC-authorized satellite networks, as well as those that are currently under consideration by the FCC. In addition, networks for which a request for coordination has been published by the ITU within ±0.15° of 179.7° E.L. have also been reviewed.

Intelsat operates the C-/Ku-band Intelsat-18 satellite at 180º E.L. and with an east-west station-keeping tolerance of ±0.05°. Thus, Inmarsat will locate the Inmarsat-5 F3 satellite at 179.7º E.L. in order to eliminate the possibility of any station-keeping volume overlap with the Intelsat-18 satellite.

There are no FCC licensed satellite networks nor are there any pending applications before the Commission to operate a satellite within ±0.15° of 179.7° E.L. With respect to published ITU filings, there are several networks filed within this sub-arc however other than Intelsat-18, none are operational. Inmarsat can find no evidence that the other filed networks are currently being progressed towards launch. Accordingly, Inmarsat concludes that physical coordination of the Inmarsat-5 F3 satellite with any other party is not required at the present time.

A.12.4 Post-Mission Disposal (§25.114(d)(14)(iv))

At the end of the operational life of the Inmarsat-5 F3 satellite, Inmarsat will maneuver the satellite to a disposal orbit with a minimum perigee of 300 km above the normal GSO operational orbit. The post-mission disposal orbit altitude is based on the following calculation, according to §25.283:

Total Solar Pressure Area "A" = 93.1 m^2

“M” = Dry Mass of Satellite = 3663 kg

“CR” = Solar Pressure Radiation Coefficient = 1.29

Therefore the Minimum Disposal Orbit Perigee Altitude is calculated as:

= 36,021 km + 1000 x CR x A/M

= 36,021 km + 1000 x 1.29 x 93.1/3663

= 36,053.8 km

= 267.8 km above GSO (35,786 km)

To provide adequate margin, the disposal orbit will be increased to at least 300 km. This will require approximately 1.4 kg of xenon propellant, taking account of all fuel measurement uncertainties, which will be allocated and reserved in order to perform the final orbit raising maneuver.

ENGINEERING CERTIFICATION

I hereby declare, under penalty of perjury, that the following statements are true and correct to the best of my information and belief:

(i) I am the technically qualified person responsible for the engineering information contained in the foregoing Application,

(ii) I am familiar with Part 25 of the Commission's Rules, and

(iii) I have either prepared or reviewed the engineering information contained in the foregoing Application and found it to be complete and accurate.

/s/

Jonas Eneberg
Vice President,
International Spectrum Management
Inmarsat

Dated: March 27, 2015