

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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JUL 17 2003

In the Matter of)
)
Iridium 2GHz LLC)
)
For Modification of Authority for)
Use of 1990-2025/2165-2200 MHz and)
Associated Frequency Bands for a)
Mobile-Satellite System)
)
To: Chief, International Bureau)

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

File No. SAT-LOA-19970926-00147

SAT-AMD-2001103-00156

SAT-MOD-20030609-00103

SAT-WAV-20030609-00104

Int'l Bureau

JUL 21 2003

Front Office

PETITION FOR RECONSIDERATION

IRIDIUM 2GHZ LLC

Michael Deutschman
Chief Administrative Officer/Chief Counsel
Patricia A. Mahoney
Vice President, Regulatory & Spectrum Affairs
Iridium 2GHz LLC
1600 Wilson Boulevard, Suite 1000
Arlington, VA 22209
703.465.1000

Peter D. Shields
Jennifer D. Hindin
Wiley Rein & Fielding LLP
1776 K Street, N.W.
Washington, DC 20006
202.719.7000

July 17, 2003

EXECUTIVE SUMMARY

Iridium 2GHz LLC (“Iridium”), by its attorneys, respectfully petitions for reconsideration of the International Bureau’s decision to return, without prejudice, Iridium’s June 6, 2003 Application for Modification of its 2 GHz MSS license (“Application”) and requests acceptance of its Application *nunc pro tunc*.

On June 6, 2003, Iridium 2GHz LLC (“Iridium”) filed an Application for Modification of the Commission license authorizing it to use the 1990-2025/2165-2200 MHz bands to provide mobile satellite service (“MSS”). The Application sought permission to substitute a single geostationary orbit (“GSO”) satellite for the 96 non-geostationary satellite orbit (“NGSO”) network that the Commission approved in Iridium’s 2 GHz License. Iridium’s Application explained that in order to effectuate this substitution, however, Iridium would need to acquire authorization to operate feeder links and tracking, telemetry and command (“TT&C”) on 125 MHz of paired spectrum in the Planned Ku-band (10.825-10.95 GHz for downlinks and 125 MHz of bandwidth within 12.75-13.25 GHz band for uplinks). Because of the freeze on applications for new frequency assignments that was imposed while Iridium prepared the Application, and which still remains in place, Iridium identified the new frequencies it wanted to use in its Application and stated its intention to file an amendment to the Application (or seek modification of any license granted pursuant to the Application) that would seek authority for the new feeder link frequencies as soon as the Commission lifted the freeze. Iridium’s Application also proposed that, in the event the Bureau determined that the Application did not constitute a “concrete system proposal,” because of the absence of a specific request for new feeder link frequencies, the Commission either waive the concrete proposal requirement or waive the freeze and grant authority for the needed feeder links.

On July 3, 2003, the International Bureau's Satellite Division issued a letter to Iridium's counsel returning the Application "without prejudice [for] refiling [with] a concrete proposal on or after the date upon which the freeze is no longer in effect." The letter asserted that Iridium's inability to seek authority for the feeder links due to the freeze rendered information in the Application regarding those links ineligible for consideration in the Bureau's eyes. The letter also rejected Iridium's alternative requests for waiver of the concrete proposal requirement and the filing freeze.

Contrary to the Bureau's finding, Iridium's Application did constitute a "concrete proposal" containing all of the information required under Sections 25.114(b) and 25.114(c)(6)(iii) of the rules. The Bureau's finding that the Application must include a valid feeder link request also clearly conflicts with both the Commission's policy that feeder links are an ancillary component to MSS applications and the Commission's prior treatment of MSS applications, which establishes that an application is complete and may be processed even if it does not include a related request for authorization of feederlinks.

Moreover, Iridium's Application provided sufficient grounds for the Bureau to waive either the "concrete proposal" requirement or the current freeze on filing applications that request new frequency assignments. As a result, the Bureau clearly erred in its determination that the Application was unacceptable. Accordingly, the Bureau should reconsider its decision and accept the Application as filed on June 6, 2003, a copy of which is attached hereto, *nunc pro tunc*.

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Mobile-Satellite System)	
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To: Chief, International Bureau		

PETITION FOR RECONSIDERATION

Pursuant to Section 1.106 of the Commission's rules,¹ Iridium 2GHz LLC ("Iridium"), by its attorneys, respectfully petitions for reconsideration of the International Bureau's decision to return, without prejudice, Iridium's June 6, 2003 Application for Modification of its 2 GHz MSS license ("Application") and requests acceptance of its Application *nunc pro tunc*.² Contrary to the Bureau's finding, Iridium's Application did constitute a "concrete proposal," in accordance with Sections 25.114(b) and 25.114(c)(6)(iii) of the Commission rules,³ and therefore should have been accepted for filing. Moreover, the Application also provided sufficient grounds for the Bureau to waive either the "concrete proposal" requirement or the current freeze on filing applications that request new frequency assignments. As will be demonstrated below, the Bureau erred in its determination that the Application was unacceptable. Accordingly, the

¹ 47 C.F.R. § 1.106 (2002).

² See Letter from Thomas S. Tycz, Chief, International Bureau Satellite Division, FCC, to Peter D. Shields, Counsel for Iridium 2GHz LLC (July 3, 2003) ("*Tycz Letter*") (attached hereto as Exhibit 1).

³ 47 C.F.R. §25.114(b) and 25.114(c)(6)(iii).

Bureau should reconsider its decision and accept the Application as filed on June 6, 2003, a copy of which is attached hereto,⁴ *nunc pro tunc*.

I. BACKGROUND

In April 2003, the Commission substantially revised its satellite licensing process by adopting the Space Station Reform *First Report and Order and Further Notice of Proposed Rulemaking*.⁵ In that *Order*, the Commission imposed a freeze on certain satellite license applications. A public notice issued on April 25, 2003 clarified that modification applications were generally exempt from that freeze.⁶ However, the freeze was extended to applications that seek authority to operate on frequencies not previously authorized for operation by that licensee.⁷ This freeze is currently in place, and will remain until a summary of the *Order* is published in the Federal Register, which has not yet occurred even though the full text of the *Order* was released to the public almost two months ago.

On June 6, 2003, Iridium 2GHz LLC (“Iridium”) filed an Application for Modification of the Commission license authorizing it to use the 1990-2025/2165-2200 MHz bands to provide

⁴ The original Application was filed at the Commission electronically via the International Bureau Filing System. A copy of the Application as filed is attached hereto as Exhibit 2. The original electronic Application is still located at the Commission, as evidenced by the Commission’s IBFS website on July 16, 2003. See Exhibit 3. The application filing fee for the Application has not been returned to Iridium and is presumably still being held by the Commission.

⁵ *Amendment of the Commission's Space Station Licensing Rules and Policies*, IB Docket No. 02-34 (rel. May 19, 2003) (“*First Space Station Reform Order*”).

⁶ See *Commission Adopts Freeze on New Satellite License Applications*, Public Notice DA 03-1284 (rel. April 25, 2003) (“This freeze is limited to applications for licenses for new satellites. It does not apply to applications for replacement satellites, modifications to existing satellite licenses, or requests for Special Temporary Authority (STA), unless those applications or requests seek authority to operate on frequencies not previously authorized for operation by that licensee.”).

⁷ *Id.*

mobile satellite service (“MSS”) (“2 GHz License”).⁸ The Application did not propose to change Iridium’s service link frequencies. The Application sought permission to substitute a single geostationary orbit (“GSO”) satellite for the 96 non-geostationary satellite orbit (“NGSO”) network that the Commission approved in Iridium’s 2 GHz License. Iridium’s Application explained that in order to effectuate this substitution, however, Iridium would need to acquire authorization to operate feeder links and tracking, telemetry and command (“TT&C”) on 125 MHz of paired spectrum in the Planned Ku-band (10.825-10.95 GHz for downlinks and 125 MHz of bandwidth within 12.75-13.25 GHz band for uplinks).⁹ In addition to describing precisely this feeder link spectrum, Iridium provided a comprehensive explanation as to how the spectrum ultimately would be incorporated into the proposed GSO system.¹⁰

Iridium’s Application was being prepared when the freeze on applications for new frequency assignments suddenly was imposed. Iridium wanted to get its Application on file expeditiously; however, the freeze prevented Iridium from requesting authorization to use new feeder link frequencies in its Application. Thus, in accordance with the freeze, Iridium (which already had authorized feeder link frequencies) identified the new frequencies it wanted to use in its Application and stated its intention to file an amendment to the Application (or seek modification of any license granted pursuant to the Application) that would seek authority for the new feeder link frequencies as soon as the Commission lifted the freeze.¹¹

⁸ Iridium 2GHz LLC Application for Modification and Public Interest Demonstration, File Nos. SAT-MOD-20030609-00103, SAT-WAV-20030609-00104 (filed June 6, 2003) (“Application”).

⁹ *Id.* at 20.

¹⁰ *Id.* at 30-31.

¹¹ *Id.* at 20.

Iridium's Application also proposed that, in the event the Bureau determined that the Application did not constitute a "concrete system proposal," because of the absence of a specific request for new feeder link frequencies, the Commission either waive the concrete proposal requirement or waive the freeze and grant authority for the needed feeder links.¹²

On July 3, 2003, the International Bureau's Satellite Division issued a letter to Iridium's counsel notifying the company that the Application was "not acceptable for filing as submitted" and returning the Application "without prejudice [for] refiling [with] a concrete proposal on or after the date upon which the freeze is no longer in effect."¹³ Specifically, the letter asserted that Iridium's Application was unacceptable for filing on one of two grounds: 1) without pre-existing authorization for the feeder links, the Application did not comply with Sections 25.114(b) and 25.114(c)(6)(iii) of the Commission's rules, and therefore, did not constitute "a concrete proposal for Commission evaluation;"¹⁴ or 2) the Application improperly sought "authority . . . to operate on frequencies not previously authorized" during the pendency of the freeze.¹⁵

II. DISCUSSION

A. Iridium's Application was a "Concrete Proposal" for the Commission's Evaluation

Iridium's Application constituted a concrete proposal as required under the Commission's rules. Iridium's Application contained all of the necessary information regarding the feeder links that is required under the rules, as well as all the other information necessary for the Commission to conduct an informed review of the Application. Despite the complete nature

¹² *Id.* at 21.

¹³ *Tycz Letter* at 2.

¹⁴ 47 C.F.R. § 25.114(b) (2002); 47 C.F.R. § 25.114(c)(6)(iii).

¹⁵ *Tycz Letter* at 1.

of the Application, and the feeder link information in particular, the Bureau incorrectly concluded that Iridium's intent to seek authority for the feeder links in a future amendment somehow rendered its Application incomplete under Sections 25.114(b) and 25.114(c)(6)(iii) of the Commission's rules and therefore unacceptable for review. As explained below, this harsh and unusual interpretation of the "concrete proposal" requirement should be reconsidered.

Section 25.114(b) of the Commission's rules states that, "[e]ach application for a new or modified space station authorization must constitute a concrete proposal for Commission evaluation."¹⁶ In applying this standard in the satellite context, the Commission has found that a "concrete proposal" includes: a description of the facilities and services offered; the launch arrangements; a schedule of investment and operating costs; and a proposed milestone schedule complying with the applicable dates.¹⁷ Section 25.114(c)(6)(iii) augments the above requirements by stating that, where applicable, applications must include "the feeder link and inter-satellite service frequencies requested for the satellite, together with any demonstration otherwise required by [the Commission rules] for use of those frequencies."¹⁸

Iridium's Application fully complied with Sections 25.114(b) and 25.114(c)(6)(iii) by providing all of the information requested in those rules. The Application provided a sophisticated, data-intensive analysis of the facilities used in the proposed system, described in great detail the new and improved services the system would offer,¹⁹ indicated that the new

¹⁶ 47 C.F.R. § 25.114(b) (2002).

¹⁷ See *In re Application to Construct, Launch and Operate a Non-Voice, Non-Geostationary Mobile Satellite System*, Order, 12 FCC Rcd 3094 (1997); *Filing of Applications for New Space Stations in the Domestic Fixed-Satellite Service*, Memorandum Opinion and Order, 93 FCC 2d 1260 (1983).

¹⁸ 47 C.F.R. § 25.114(c)(6)(iii) (2002).

¹⁹ Application at 10-14.

satellite design was compatible with a variety of launch vehicles,²⁰ and presented a fully compliant milestone completion schedule.²¹ As for the feeder link information, the Application provided an extensive, technically supported description of the frequencies Iridium proposed to use and how they would be utilized in the GSO system.²² The Application also included information pertaining to the feeder link antenna gain contours and the efforts in which Iridium would engage to protect other licensees against possible interference caused by Iridium's use of the feeder links.²³ In total, the Application was a "substantially complete" submission of information that constituted a comprehensive and concrete proposal upon which the Commission could make a fully informed decision.

Indeed, the Bureau's letter does not claim that the substance of the information provided by Iridium is insufficient grounds upon which to base a decision. Instead, the Bureau simply states that, "[t]o the extent the application is not currently seeking authority for feeder links, it does not comply with Sections 25.114(b) and 25.114(c)(6)(iii) of the Commission's rules."²⁴ From this language and the complete nature of the Application described above, it only can be inferred that Iridium's inability to seek authority for the feeder links due to the freeze rendered information in the Application regarding those links ineligible for consideration in the Bureau's

²⁰ *Id.* at 39.

²¹ *Id.* at 14 – 19. As the Commission has eliminated the financial qualification requirement for MSS licensees, in favor of strict enforcement of the milestone requirements, Iridium was not required to, and therefore did not, include in its application a schedule of investment and operating costs. *See The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, Report & Order, 15 FCC Rcd 16127, 16150-52 (2000) ("2 GHz MSS Order"). *See Application of the Boeing Company for Modification of Authority For Use of the 1990-2025/2165-2200 MHz and Associated Frequency Bands for a Mobile Satellite System*, File No. SAT-MOD-20020726-0013, DA 03-2073 (rel. June 24, 2000).

²² Application at 20-21, 29-32, Appendix C.

²³ *Id.* at 30-32.

²⁴ *Tycz Letter* at 2.

eyes. Such treatment of that information, however, is unwarranted, without basis in the rules establishing the concrete proposal requirement, and contrary to the Commission's own satellite licensing application procedures.

Sections 25.114(b) and 25.114(c)(6)(iii) make no mention of a requirement that an applicant seek authority for every component of its proposal at the time of the application. The intent of the rule is to ensure that the Commission has sufficient information to process the application in a timely manner, so as to "ensure that an applicant does not tie up spectrum while it decides whether to proceed with its program."²⁵ However, the fact that part of a proposal requires Commission approval separate from that of the whole proposal does not mean that the application will facilitate delay or warehousing of spectrum. Indeed, by identifying the feeder link frequencies that it would seek to use and thus notifying the Commission of the spectrum it would no longer need to use,²⁶ Iridium was relinquishing spectrum—not warehousing it. Thus, the intent of the rule was served by Iridium's Application.

Furthermore, although it is unlikely that the Application would have been processed to grant before the freeze was lifted and the Application amended, the Commission can consider an application, including a component requiring separate, independent approval, and make the grant of the application independent, if necessary, from the subsequent approval of the individual component. Such a process is not at all unusual with respect to satellite applications that may involve several sets of frequencies in different bands, not all of which are allocated at the same time. Also, as the Bureau is aware, the Commission frequently issues partial or conditional

²⁵ *The Application of Volunteers In Technical Assistance, Application For Authority to Construct, Launch and Operate a Non-Voice, Non-Geostationary Mobile-Satellite System*, Order and Authorization, 11 FCC Rcd 1358, ¶ 1363 (1995).

²⁶ Application at 30-31.

grants of authority. These partial or conditional grants of authority represent the Commission's acknowledgement that a proposal may be concrete and ready for review, while the ultimate acceptance of certain components is unclear. Here, Iridium's Application, as submitted, provided more than enough information on the feeder links for the Commission to review the proposal and make a prompt determination conditioned, if necessary, upon Iridium's subsequent amendment of the Application or modification of the resulting license.

Indeed, in issuing the initial authorization for the Iridium system to the system's initial licensee, Motorola Satellite Communications, Inc. ("Motorola"), the Commission chose to issue the system license without final authority to operate the feeder links. Motorola received authority to construct, launch, and operate its system; but the feeder link authority was only to construct, at the licensee's own risk, the system with the feeder links. Previously the Commission had concluded that it was unable to assign feeder link frequencies unconditionally to any applicant because it was unsure whether spectrum would be available for Big LEO feeder links after international spectrum coordination was completed. Pursuant to the Big LEO Order,²⁷ the Commission granted Motorola and other qualified applicants licenses authorizing them to construct, "at their own risk," systems capable of operating on the feeder link frequencies they requested.²⁸ The Commission deferred action on requests for specific feeder link frequencies

²⁷ *Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-25 MHz Frequency Band*, 9 FCC Rcd 5936, at ¶¶163-69 (1994) ("Big LEO Order").

²⁸ *Motorola Satellite Communications, Inc. for Authority to Construct, Launch, and Operate a Low Earth Orbit Satellite System in the 1616-1626.5 MHz Band*, 10 FCC Rcd 2268 (1995) ("Motorola Big LEO License"). See also *Loral/Qualcomm Partnership, L.P. For Authority to Construct, Launch, and Operate Globalstar, a Low Earth Orbit Satellite System to Provide Mobile Satellite Services in the 1610-1626.5 MHz/2483.5-2500 MHz Bands*, 10 FCC Rcd 2333 (1995) ("L/Q Big LEO License"); *TRW Inc. for Authority to Construct, Launch, and Operate a Low Earth Orbit Satellite System in the 1610-1626.5 MHz/2483.5-2500 MHz Band*, 10 FCC Rcd 2263 (1995).

until the spectrum became available for assignment and sufficient spectrum was available to satisfy the feeder link requirements of all licensed Big LEO systems. The fact that the Iridium system and other Big LEO systems were licensed without also being licensed for feeder link frequencies at that time further demonstrates that an applicant may have a concrete proposal that can be considered, and even granted, although specific feeder link frequencies may not be assigned or even identified at the same time.²⁹

Finally, the Commission clearly has established that feeder links are ancillary to the primary service link operations of an MSS system.³⁰ The Commission's grant of Big LEO licenses conditioned on the future availability of feeder link spectrum, as described above, also illustrates the Commission's willingness to bifurcate MSS applications where necessary. Indeed, the Commission has now incorporated into its new general MSS procedures a procedure similar to the approach it took with the initial Big LEO licensees' applications. On June 26, 2003, the Commission released an Erratum correcting its *First Space Station Reform Order*.³¹ In the *Erratum*, the Commission amended Section 25.156(d)(4) of the rules to state that "[a]pplications for feeder link authority or intersatellite link authority will be treated like an application separate from its associated service band," once the filing freeze is lifted.³² Under this rule, requests for

²⁹ The Commission has taken this same "conditional license" approach with subsequent applicants requesting access to spectrum the availability of which was contingent upon future occurrences. See *Mobile Communications Holdings, Inc.; For authority to construct, launch, and operate an elliptical low earth orbit Mobile Satellite System*, 12 FCC Rcd 9663 (1997) ("MCHI Big LEO License"); *Teledesic Corporation Application for Authority to Construct, Launch, and Operate a Low Earth Orbit Satellite System in the Domestic and International Fixed Satellite Service*, 12 FCC Rcd 3154 (1997).

³⁰ See, e.g., *Motorola Big LEO License at ¶120; L/Q Big LEO License; MCHI Big LEO License*.

³¹ *Amendment of the Commission's Space Station Licensing Rules and Policies*, Erratum, IB Docket No. 02-34, (rel. June 26, 2003) ("Erratum").

³² *Id.* at 2.

both service links and feeder links made in a single application, after the lifting of the freeze, will be separated out and considered as to two distinct applications. This approach is necessary because requests often involve totally different bands in different allocation proceedings. The Bureau's return of Iridium's Application, however, runs counter to this policy and to precedent and further demonstrates that the Bureau erred in returning Iridium's Application.

B. Good Cause Exists for the International Bureau To Waive the "Concrete Proposal" Requirement or the Filing Freeze

In its Application, Iridium requested that, in the event the Bureau determines that the Application does not constitute a "concrete system proposal," the Bureau should waive Sections 25.114(b) and 25.114(c)(6)(iii) of the rules or, alternatively, waive the freeze.³³ The Commission's well-established practice is to waive its rules if "good cause" is shown.³⁴ In this case, however, the Bureau summarily rejected Iridium's waiver requests without considering the demonstrated good cause.

In rejecting Iridium's request for a waiver of the "concrete proposal" requirement, the Bureau simply stated that, "a waiver of those rules [Sections 25.114(b) and 25.114(c)(6)(iii)] is not warranted for purposes of avoiding the effects of the freeze."³⁵ Yet waiver of those rules would not circumvent the freeze. Iridium indicated that it would comply with the freeze by filing an amendment to its application seeking to use new feederlink frequencies after the freeze is lifted.³⁶ The effect of the waiver would be to permit the Bureau to begin to process Iridium's

³³ Application at 21.

³⁴ 47 C.F.R. §1.3.

³⁵ *Tycz Letter* at 2.

³⁶ Application at 21.

modified use of its service link spectrum—spectrum that is already licensed to Iridium and thus not part of the freeze.

Moreover, to the extent that the Bureau somehow could conclude that a modification application that describes in detail but does not specifically request a change in feederlink frequencies is not a concrete proposal, there is good cause to waive the concrete proposal requirement in this case. The imposition of a freeze is a rare event, unanticipated when Iridium prepared its Application and beyond Iridium's control. As a result of this extraordinary regulatory situation, Iridium is effectively blocked from filing an application to modify its licensed system, which would otherwise not be encompassed within the freeze, solely because the application seeks to modify an aspect of the system—feeder links--that the Commission has traditionally considered to be ancillary.³⁷

Because of Iridium's intention to build and implement its 2 GHz system in accordance with all milestones, Iridium is proceeding diligently, at its own risk, with its proposed system. Indeed, Iridium's independent satellite manufacturer has already completed critical design review.³⁸ Iridium petitions the Bureau to reconsider its July 3, 2003 decision so that Iridium's Application may be processed without further delay. As explained in detail in the Application, Iridium's proposed GSO system would allow, among other things: the introduction of smaller, lighter phones with better battery power; increased penetration and extended service areas

³⁷ See *Motorola License*, ¶ 20.

³⁸ See Iridium Certification of Milestone Completion, SAT-LOA-19970926-00147, SAT-AMD-2001103-00156, SAT-MOD-20030609-00103, SAT-WAV-20030609-00104 (filed July 17, 2003).

(including underserved rural areas); new improved services; and new homeland defense and public safety functionalities.³⁹

These circumstances—where a licensee is diligently incorporating technological advances to provide improved service to the public but is denied the right to timely seek modification of its license solely because of a rare freeze on applications, the imposition of which is only required due to the strict, literal application of the freeze with respect to an ancillary aspect of the application, which would not otherwise be barred—constitute good cause for waiver.

C. Waiver of the Filing Freeze

As with its rejection of Iridium’s request for a waiver of the “concrete proposal” requirement, the Bureau ignored long-standing Commission precedent allowing for waivers of filing freezes when the purpose of the freeze would not be undermined by the waiver’s grant. For example, the Commission waived a freeze on applications for authority to provide aeronautical satellite services via INMARSAT, allowing Comsat to modify its earth stations prior to receiving authorization.⁴⁰ The Commission noted that its grant of the waiver did not represent a grant of authority to provide the services, but merely to modify equipment in preparation for such authority.⁴¹ The Commission stated that it found no harm in permitting Comsat to “take the limited steps at its own risk” and that in no way did its decision represent a decision to prejudge “whether Comsat ultimately would be permitted to provide INMARSAT

³⁹ Application at 10-14.

⁴⁰ *Communications Satellite Corporation; Request for Waiver of Freeze on Applications to Provide Aeronautical Satellite Services via INMARSAT For a Waiver Pursuant to Section 319(d) of the Communications Act of 1934, as amended, to make modifications to coast earth stations to provide Aeronautical Satellite Services via INMARSAT*, 4 FCC Rcd 2488 at ¶ 7 (1989) (“*Comsat Waiver*”).

⁴¹ *Id.* at ¶ 7.

aeronautical services.”⁴² Similarly, by allowing Iridium to simply file its feeder link request, the Commission would in no way need to make a decision, or even consider, whether Iridium should receive authorization for the requested feeder links until after the lifting of the freeze. Such an approach is consistent with the Commission’s approach to processing feeder link applications, as described above, and would not undermine the freeze’s stated purpose of allowing the Commission more time to prepare its filing system and review process for handling the expected large influx of applications.⁴³

III. CONCLUSION

For the forgoing reasons, the Commission should reconsider its decision to return Iridium’s Application as unacceptable for filing and instead accept the originally filed Application, *nunc pro tunc*.

Respectfully submitted,

IRIDIUM 2GHz LLC

By: 

Peter D. Shields
Jennifer D. Hindin
of
Wiley Rein & Fielding LLP
1776 K Street, N.W.
Washington, DC 20006
202-719-7000

Michael Deutschman
Chief Administrative Officer and Chief Counsel
Patricia A. Mahoney
Vice President, Regulatory & Spectrum Affairs
Iridium 2GHz LLC
1600 Wilson Boulevard, Suite 1000
Arlington, VA 22209
703-465-1000
July 17, 2003

⁴² *Id.*

⁴³ *First Space Station Reform Order* at ¶ 88-89.

Exhibit 1

**Letter from Thomas S. Tycz, Chief, International Bureau Satellite
Division, FCC, to Peter D. Shields, Counsel for Iridium 2GHz LLC
(July 3, 2003)**



FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

July 3, 2003

In Reply Refer To:

File Nos. SAT-MOD-20030609-00103
SAT-WAV-20030609-00104

Via Fax (202-719-7049) and U.S. Mail

Mr. Peter D. Shields
Wiley Rein & Fielding LLP
1776 K Street, N.W.
Washington, D.C. 20006

Re: Iridium 2GHz LLC
Application for Modification and Public Interest Demonstration (S2325)

Dear Mr. Shields:

On April 23, 2003, the Commission adopted the Space Station Reform *First Report and Order and Further Notice of Proposed Rulemaking*, substantially revising its satellite licensing process. In that *Order*, the Commission adopted a freeze on certain satellite license applications, including, *inter alia*, requests that seek authority to operate on frequencies not previously authorized for operation by that licensee. This freeze began on April 23, 2003, and will remain in effect until a summary of the *First Report and Order* is published in the Federal Register. See Public Notice, Commission Adopts Freeze on New Satellite License Applications, DA 03-1284 (rel. April 25, 2003).

An examination of the above-referenced application shows that Iridium 2GHz LLC ("Iridium") either seeks authority, during the pendency of the freeze, to operate on frequencies not previously authorized, or has not submitted a concrete proposal for Commission evaluation.

The application appears in some portions to seek authority for feeder link operations. On page 30, "Iridium requests Commission authority to provide feederlinks for its 2 GHz MSS system of 125 MHz of spectrum in each transmission direction within the Planned Ku-band" A similar statement appears on page 32 ("Iridium seeks authority to operate TT&C and feederlinks for its GSO MSS network using 125 MHz of paired spectrum in the Planned Ku-band . . ."). Pages 25-27 of the application detail Iridium's proposed gateway-to-satellite and satellite-to-gateway frequency and polarization plans, including the use of previously-unauthorized feeder link spectrum. On page 20 of the application, Iridium specifies precise previously-unauthorized feeder link spectrum "in order to satisfy the requirement to provide a 'concrete proposal' for Commission consideration." To the extent the application requests authority for new feeder link frequencies, there is not an adequate justification for a waiver of the applicable freeze. Iridium's stated justification for the waiver is that the waiver should be granted for the same reasons that warrant grant of its application. This argument does not provide any unique or compelling reasons for distinguishing Iridium's application from any other application subject to the freeze, since any proposal that might ultimately be deemed to serve the public interest would meet this test.

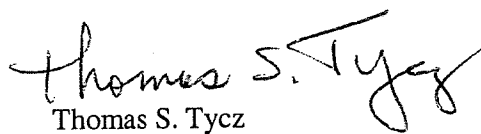
The application appears in other portions to indicate that Iridium is not currently requesting feeder link authority. On page 20 of the application, Iridium states that it "intends to file an amendment to this application . . . that will seek authority to operate feederlinks and [TT&C] for its GSO network . . . as

Mr. Peter D. Shields
July 3, 2003
Page 2

soon as the Commission lifts the 'freeze' on the filing of requests for new spectrum assignments." To the extent the application is not currently seeking authority for feeder links, it does not comply with Sections 25.114(b) and 25.114(c)(6)(iii) of the Commission's rules. Furthermore, a waiver of those rules is not warranted for purposes of avoiding the effect of the freeze.

Thus, regardless of whether Iridium is currently seeking feeder link authority, the application is not acceptable for filing as submitted. We therefore return Iridium's application without prejudice to refiling a concrete proposal on or after the date upon which the freeze is no longer in effect.

Sincerely,

A handwritten signature in black ink that reads "Thomas S. Tycz". The signature is written in a cursive style with a large, sweeping initial 'T'.

Thomas S. Tycz
Chief, Satellite Division
International Bureau

Enclosure

Exhibit 2

Iridium 2GHz LLC
Application for Modification and Public Interest Demonstration
File Nos. SAT-MOD-20030609-00103, SAT-WAV-20030609-00104
(filed June 6, 2003)

Approved by OMB
3060-0678



FCC APPLICATION FOR SPACE AND EA STATION:MOD OR AMD - MAIN FOR	S2325 SAT-MOD-20030609-00103 IB2003001092 Iridium 2GHz LLC
FCC 312 MAIN FORM FOR OFFICIAL USE ON [Click here for INSTRUCTIONS.]	S2325 SAT-WAV-20030609-00104 Iridium 2GHz LLC

Menu

APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:
Iridium 2GHz LLC Modification

1-8. Legal Name of Applicant	
Name: Iridium 2GHz LLC	Phone Number: 703-465-1000
DBA Name:	Fax Number: 703-465-1039
Street: 1600 Wilson Blvd. Suite 1000	E-Mail:
City: Arlington	State: VA
Country: USA	Zipcode: 22209 -
Attention: Mr. Michael Deutschman	
9-16. Name of Contact Representative (If other than applicant)	
Name: Mr. Peter Shields	Phone Number: (202) 719-3249
Company: Wiley Rein & Fielding LLP	Fax Number: (202) 719-7049
Street: 1776 K Street, NW	E-Mail: pshields@wrf.com
City: Washington	State: DC
Country: USA	Zipcode: 20006 -
Contact Title: Partner	Relationship: Legal Counsel

CLASSIFICATION OF FILING

17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b.	<input type="checkbox"/> (N/A) b1. Application for License of New Station <input type="checkbox"/> (N/A) b2. Application for Registration of New Domestic Receive-Only Station <input checked="" type="radio"/> b3. Amendment to a Pending Application
---	--

<p>a.</p> <p><input type="radio"/> a1. Earth Station</p> <p><input checked="" type="radio"/> a2. Space Station</p>	<p style="text-align: center;">STOP</p> <p>(Space Station amendments that include frequency bands other than those identified in the underlying application are not permitted at this time pursuant to FCC 03-102.)</p> <p><input checked="" type="radio"/> b4. Modification of License or Registration</p> <p style="text-align: center;">STOP</p> <p>(Space Station modification applications that include frequency bands other than those already authorized are not permitted at this time pursuant to FCC 03-102.)</p> <p>(N/A) b5. Assignment of License or Registration</p> <p>(N/A) b6. Transfer of Control of License or Registration</p> <p><input type="radio"/> b7. Notification of Minor Modification</p> <p>(N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite</p> <p>(N/A) b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States</p> <p>(N/A) b10. Other (Please specify)</p>
--	--

17c. Is a fee submitted with this application?

If Yes, complete and attach FCC Form 159.

If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).

Governmental Entity Noncommercial educational licensee

Other (please explain):

17d. Fee Classification CGW

<p>18. If this filing is in reference to an existing station, enter:</p> <p>(a) Call sign of station: S2325</p>	<p>19. If this filing is an amendment to a pending application enter both fields, if this filing is a modification please enter only the file number:</p> <p>(a) Date pending application was filed: _____ (b) File number: SATLOA1997092600147</p>
---	---

TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s):
Select all that apply:

a. Fixed Satellite
 b. Mobile Satellite
 c. Radiodetermination Satellite
 d. Earth Exploration Satellite
 e. Direct to Home Fixed Satellite

 f. Digital Audio Radio Service
 g. Other (please specify)

<p>21. STATUS: Choose the button next to the applicable status. Choose only one.</p> <p><input type="radio"/> Common Carrier <input checked="" type="radio"/> Non-Common Carrier</p>	<p>22. If earth station applicant, check all that apply.</p> <p><input type="checkbox"/> Using U.S. licensed satellites</p> <p><input type="checkbox"/> Using Non-U.S. licensed satellites</p>
--	--

23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:

Connected to a Public Switched Network Not connected to a Public Switched Network N/A

24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s).

a. C-Band (4/6 GHz) b. Ku-Band (12/14 GHz)

Frequency Lower: 1990 Frequency Upper: 2200

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

- a. Fixed Earth Station
- b. Temporary-Fixed Earth Station
- c. 12/14 GHz VSAT Network
- d. Mobile Earth Station
- e. Geostationary Space Station
- f. Non-Geostationary Space Station
- g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY:

- Transmit/Receive
- Transmit-Only
- Receive-Only
- N/A

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an "X" in the box(es) next to all that apply.)

- a -- authorization to add new emission designator and related service
- b -- authorization to change emission designator and related service
- c -- authorization to increase EIRP and EIRP density
- d -- authorization to replace antenna
- e -- authorization to add antenna
- f -- authorization to relocate fixed station
- g -- authorization to change assigned frequency(ies)
- h -- authorization to add Points of Communication (satellites & countries)
- i -- authorization to change Points of Communication (satellites & countries)
- j -- authorization for facilities for which environmental assessment and radiation hazard reporting is required
- k -- Other (Please specify) authorization to change from NGSO to GSO

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as an exhibit to this application. A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments.

Yes No

Attachment

ALIEN OWNERSHIP

Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30-34.

30. Is the applicant an alien or the representative of an alien?

Yes No N/A

29. Is the applicant a foreign government or the representative of any foreign government?	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A
30. Is the applicant an alien or the representative of an alien?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
31. Is the applicant a corporation organized under the laws of any foreign government?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.	Exhibit 1

BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules? If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.	<input checked="" type="radio"/> Yes <input type="radio"/> No
	Exhibit 2
36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explanation of circumstances.	<input type="radio"/> Yes <input checked="" type="radio"/> No
	Attachment
37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explanation of circumstances.	<input type="radio"/> Yes <input checked="" type="radio"/> No
	Attachment
38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances	<input type="radio"/> Yes <input checked="" type="radio"/> No
	Attachment
39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhibit, an explanation of the circumstances.	<input type="radio"/> Yes <input checked="" type="radio"/> No
	Attachment
40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.	
	Attachment
41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of	<input checked="" type="radio"/> Yes <input type="radio"/> No

"party to the application" for these purposes.

42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43.

Yes No

Attachment

42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station? n/a

43. Description. (Summarize the nature of the application and the services to be provided).
Iridium requests authority to modify the authorization provided by the Commission in Iridium's 2 GHz MSS license in order to launch and operate a single GSO MSS satellite system, rather than the NGSO MSS constellation provided for in Iridium's July 17, 2001 authorization.

Mod Ap

CERTIFICATION

The Applicant 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, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- Individual
- Unincorporated Association
- Partnership
- Corporation
- Governmental Entity
- Other (please specify) LLC

45. Name of Person Signing
Michael Deutschman

46. Title of Person Signing
Chief Administrative Officer and Counsel

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

Form 312 Schedule B

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

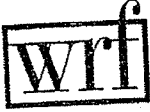
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maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection and reduce the burden it causes you, please write to the Federal Communications Commission, AMD-PERM, Paperwork Reduction Project (3060-0678), Washington, DC 20554. We will also accept your comments regarding the Paperwork Reduction Act aspects of this collection via the Internet if you send them to jboley@fcc.gov. PLEASE DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.

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THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104-13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.

Menu



Wiley Rein & Fielding LLP

1776 K STREET NW
WASHINGTON, DC 20006
PHONE 202.719.7000
FAX 202.719.7049

Virginia Office
7925 JONES BRANCH DRIVE
SUITE 6200
McLEAN, VA 22102
PHONE 703.905.2800
FAX 703.905.2820

www.wrf.com

June 6, 2003

Peter D. Shields
202.719.3249
pshields@wrf.com

Marlene H. Dortch, Secretary
Federal Communications Commission
International Bureau - Satellites
P.O. Box 358210
Pittsburgh, PA 15251-5210

Re: Iridium 2GHz LLC, For Modification of Authority For Use of the 1990-2025/2165-2200 MHz and Associated Frequency Bands for a Mobile-Satellite System, File Nos. SAT-LOA-19970926-00147, SAT-AMD-20001103-00156

Dear Ms. Dortch:

Iridium 2GHz LLC today filed electronically using the International Bureau Filing System ("IBFS") an application to modify the above-referenced authorization to launch and operate a Mobile-Satellite Service ("MSS") network in the 2 GHz MSS band (the "2 GHz License"). Specifically, Iridium seeks to substitute a single geostationary orbit ("GSO") satellite for the 96 non-geostationary satellite orbit ("NGSO") network that the Federal Communications Commission ("FCC" or "Commission") approved in the 2 GHz License.

The Commission staff informally has advised Iridium that the appropriate payment code for this application is "BNY" and that the appropriate filing fee is \$98,645.00. This filing fee corresponds to the fee for an initial application for a GSO satellite network. Without waiving its right to request a partial refund at a later date, Iridium is submitting by hand to Mellon Bank in Pittsburgh, PA a \$98,645.00 filing fee, along with a FCC Form 159 containing the "BNY" code.

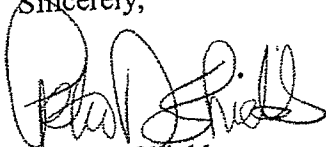
As the Commission staff is aware, the IBFS electronic Form 312 for modification applications requires an applicant to select from a limited number of payment type codes. The "BNY" code is not included as an option. As a result, Iridium submitted its electronic FCC Form 312 using the "CGW" code that corresponds to a modification of a NGSO satellite authorization. However, as noted in the prior paragraph, Iridium is filing the FCC Form 159 with the recommended "BNY" code and filing fee of \$98,645.00.

Wiley Rein & Fielding LLP

Marlene H. Dortch
June 6, 2003
Page 2

Thank you for your attention to this matter. If you have any questions about this filing, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter D. Shields". The signature is written in a cursive style with a large initial "P".

Peter D. Shields

Enclosures

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)

Iridium 2GHz LLC)

For Modification of Authority for)
Use of 1990-2025/2165-2200 MHz and)
Associated Frequency Bands for a)
Mobile-Satellite System)

File No. SAT-MOD-_____
SAT-LOA-19970926-00147
SAT-AMD-20001103-00156

**APPLICATION FOR MODIFICATION
AND PUBLIC INTEREST DEMONSTRATION**

Michael Deutschman
Chief Administrative Officer/Chief Counsel
Patricia A. Mahoney
Vice President, Regulatory & Spectrum Affairs
Iridium 2GHz LLC
1600 Wilson Boulevard, Suite 1000
Arlington, VA 22209
703.465.1000

Richard E. Wiley
Peter D. Shields
Jennifer D. Hindin
Wiley Rein & Fielding LLP
1776 K Street, N.W.
Washington, DC 20006
202.719.7000

June 6, 2003

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CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION SUBMITTED IN THE APPLICATION

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APPENDIX D. APPENDIX 30 B NOTICE

APPENDIX E. ITU ADVANCE PUBLICATION INFORMATION (S-BAND) AND COST RECOVERY

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Iridium 2GHz LLC)	File No. SAT-MOD-_____
)	SAT-LOA-19970926-00147
For Modification of Authority for)	SAT-AMD-20001103-00156
Use of 1990-2025/2165-2200 MHz and)	
Associated Frequency Bands for a)	
Mobile-Satellite System)	
)	

To: Chief, International Bureau

APPLICATION FOR MODIFICATION AND PUBLIC INTEREST DEMONSTRATION

Iridium 2GHz LLC (“Iridium”),¹ by its attorneys and pursuant to Sections 308 and 309 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 308 and 309, and Section 25.117 of the rules of the Federal Communications Commission (“FCC” or “Commission”), 47 C.F.R. § 25.117, respectfully requests authority to modify the above-referenced authorization to launch and operate a 2 GHz satellite system. This document provides a public interest demonstration, submits technical information required by Section 25.114 of the FCC’s rules, 47 C.F.R. §25.114, and requests certain waivers of the FCC’s rules. This information has been filed electronically as an attachment to FCC Form 312.

¹ On May 29, 2003, Iridium Constellation LLC assigned its 2 GHz license to its wholly-owned subsidiary Iridium 2GHz LLC. *Iridium 2GHz LLC*, File No. SAT-ASG-20030423-00073 (filed Apr. 23, 2003; granted May 7, 2003); Letter from Jennifer D. Hindin, Counsel to Iridium Constellation LLC and Iridium 2GHz LLC to Marlene H. Dortch, Secretary, FCC (dated May 30, 2003) (providing notice of the consummation of *pro forma* assignment). Iridium Satellite LLC, the parent company of Iridium Constellation LLC, holds a license and operates a NGSO MSS constellation in a portion of the 1610-1626.5 MHz and 2483.5-2500 MHz, or “Big LEO.” band. These companies are collectively referred to as “Iridium” in this application.

I. INTRODUCTION AND BACKGROUND

A. Introduction

By this Application for Modification, Iridium requests permission to substitute a single geostationary satellite orbit ("GSO" or "GEO") mobile satellite service ("MSS") satellite for the non-geostationary satellite orbit ("NGSO") constellation of 96 satellites specified in its current authorization. Iridium seeks this change due to the technical limitations inherent in the previously approved NGSO constellation and to take advantage of a number of advancements in satellite technology since Iridium's predecessor applied for its initial authorization almost six years ago, in 1997. Modifying its system at this time will allow Iridium to benefit from these technological advancements and to construct a more flexible system that will be able to better serve the public interest with novel and improved service offerings, respond to future technological developments, and make more efficient use of spectrum.

Iridium can modify its system, as proposed herein, and still commence operations within the time currently required. Moreover, Iridium intends to satisfy *on time* all of the construction and deployment milestones applicable to 2 GHz GSO satellites. These milestones include the fast-approaching July 17, 2003 deadline for critical design review ("CDR") and the same July 17, 2007 system operational date that currently applies to Iridium's licensed NGSO system. No requests for extensions or waivers of milestones are included or proposed herein. Thus, approval of this modification application will bring numerous public interest benefits without delaying initiation of any services to the public or undermining the Commission's licensing process for the 2 GHz band.

B. Background

In 1997, Iridium's predecessor, Iridium LLC, filed an application to launch and operate a 96-satellite NGSO MSS network as part of the Commission's first 2 GHz processing round.² Called the MACROCELL system, this multi-satellite NGSO system was intended "to be separate and distinct from, but interoperable with, the IRIDIUM[®] System," which was then licensed to Motorola Satellite Communications, Inc. (Motorola), although other assets of the satellite system were owned by Iridium LLC.³ As the original 2 GHz application reflected, at the time of the application's filing, the IRIDIUM System was not yet operational and was not expected to become operational for at least another year. In fact, only 29 of the IRIDIUM satellites had been launched.

In its application, Iridium LLC proposed a system based on assumptions concerning the not yet operational MSS Big LEO system. It also made assumptions about the nature of wireless technology by the time the new system would be operational and made system design decisions that reflect an intention to at least be compatible with whatever standards might be adopted for Future Public Land Mobile Telecommunications Systems (FPLMTS) or IMT-2000, proposed world-wide wireless systems.⁴

² *Application of Iridium LLC*; File No. SAT-LOA-19970926-00147 (filed Feb. 26, 1997) ("*Iridium Application*").

³ *Id.* at 2.

⁴ *Id.* at 3.

The IRIDIUM System became operational in November 1998. Less than a year later, Iridium LLC was in bankruptcy. In 2001, the FCC licensed the Iridium 2 GHz system as initially proposed.⁵

In February 2002, following conclusion of the Iridium LLC bankruptcy proceeding, the Commission consented to the assignment of the 2 GHz license, as well as various licenses and authorizations relating to the operation of the Big LEO MSS system, to Iridium.⁶ Thus, Iridium has been the 2 GHz licensee for slightly over one year.

Iridium satisfied its first 2 GHz milestone obligation in August 2002 by entering into a satellite construction contract with Boeing Satellite Systems, Inc. ("Boeing").⁷ At the same time, Iridium has developed the Iridium System into the fastest growing global MSS network, providing voice, data and paging traffic to rural and remote areas across the United States and around the world.

The successful purchase and restructuring of the Iridium Big LEO system in 2001-02, along with the subscriber growth experienced ever since, demonstrate the growing acceptance of, and need for, MSS services in the global communications mosaic.⁸ Iridium remains wholly committed to fulfilling MSS needs worldwide.

⁵ *Application of Iridium LLC; Concerning Use of the 1990-2025/2165-2200 MHz and Associated Frequency Bands for a Mobile-Satellite System*, Order & Authorization, 16 FCC Rcd 13778 (Int'l Bur. 2001) ("Iridium Order").

⁶ *Applications of Space Station System Licensee, Inc., Assignor and Iridium Constellation LLC, Assignee*, 17 FCC Rcd 2271 (Int'l Bur. 2002).

⁷ Public Notice, Satellite Division Information: 2 GHz Licensees in Compliance with First Milestone Requirement, Report No. SAT-00135, DA 03-386 (Feb. 10, 2003).

⁸ For example, the U.S. Department of Defense (DOD) uses the Iridium System for crucial communications services including, but not limited to, secure global mobile handheld communications services.

As Iridium's experience in the market and with the performance of its system has developed, Iridium has become convinced that the public interest would not be served by Iridium constructing another large constellation global NGSO system, particularly where the technology now exists to construct a system that will be sufficiently flexible to adapt to technology and market developments far into the future, truly complementing the existing Iridium System. Following extensive analyses of its current system and of technological and market developments, Iridium, has decided that the deployment of a single GSO 2 GHz satellite would better serve the public interest than would deployment of the authorized NGSO satellite system and is a better technological decision.

II. GRANT OF IRIDIUM'S MODIFICATION REQUEST CONFORMS TO FCC RULES AND PRECEDENT AND SERVES THE PUBLIC INTEREST

Grant of this request to substitute a GSO satellite for Iridium's authorized NGSO constellation conforms to FCC rules and precedent and will result in numerous public interest benefits.⁹ Licensees frequently request system design modifications between licensing and launch. In reviewing such requests, the Commission takes into consideration "the several years required to construct a satellite or a constellation of satellites, the rapidly changing technology, and [the policy] goal of encouraging more efficient use of the radio spectrum."¹⁰ The FCC typically concludes that permitting such modifications is beneficial because—as here—it allows

⁹ See 47 U.S.C. § 309(a) (2001).

¹⁰ See *Sirius Radio Inc. for Minor Modification of License to Construct, Launch and Operate a Non-Geostationary Satellite Digital Audio Radio Service System*, Order and Authorization, 16 FCC Rcd 5419, 5420 (2001) ("Sirius Modification Order") (allowing Sirius to modify its licensed network of two GSO satellites to a constellation of three elliptical NGSO satellites); see also *Columbia Communications Corporation*, Order and Order on Reconsideration, 16 FCC Rcd 10867, 10872 (2001) (permitting Loral to convert its network design to add inter-satellite links) ("Columbia Communications").

licensees “to take advantage of the latest technology in providing service to the public.”¹¹ On this basis, the Commission’s policy is to “permit licensees to modify satellite systems, when possible, to make design improvements.”¹² Specifically, the Commission will grant a modification request when the proposal presents no significant interference problems and it is otherwise consistent with Commission policies:

Given the fairly lengthy time period required to construct a satellite, licensees often file requests to modify the technical design of their satellites as they are being built. If the proposed modification does not present any significant interference problems and is otherwise consistent with Commission policies, it is generally granted.¹³

As discussed below, Iridium’s proposed modification satisfies this standard, while bringing about numerous public interest benefits.

A. Iridium Seeks To Take Advantage of Significant Technological Advancements

Iridium has decided to change the orbital configuration and number of satellites in its 2 GHz MSS network to take advantage of technological advancements that have emerged since Iridium’s predecessor designed and applied for the 2 GHz NGSO system reflected in the current authorization. Below is a brief discussion of the technological considerations that drove Iridium’s decision to file this Application for Modification.

First, the GSO system now contemplated offers better flexibility to accommodate evolving services and features, and therefore air-interfaces, than the licensed NGSO system.

¹¹ *Sirius Modification Order*, 16 FCC Rcd at 5420 (citing *American Satellite Company*, 5 FCC Rcd 1186, 1186 (1990)) (“*American Satellite Company*”).

¹² *Id.*

¹³ *Teledesic LLC for Minor Modification of License to Construct, Launch and Operate a Non-Geostationary Fixed Satellite Service System*, 14 FCC Rcd 2261, 2262-63 (1999) (“*Teledesic Modification Order*”); See also *American Satellite Company*, 5 FCC Rcd at 1186; *Hughes Communications Galaxy, Inc.*, 5 FCC Rcd 1653 (1990);

Indeed, in the six years following the original NGSO filing, a significant amount of standardization has occurred in the definition of "3G" services and air-interfaces. After an objective engineering tradeoff analysis was performed in support of the System Requirement Review ("SRR"), Iridium concluded that the flexibility provided by the originally proposed NGSO design (*i.e.*, baseband processors) would be inadequate to meet Iridium's customers' needs and expectations over the life of the system. Instead, Iridium has become convinced that the system agility inherent in the proposed GSO design (*e.g.*, Band width channel flexibility of 5 MHz, 2.5 MHz, 1.25 MHz, etc.) will allow Iridium to continue upgrading the air-interface throughout the anticipated 12-year operational life of the satellite. As a result, Iridium will be able to provision new services and features responsive to technological and market developments well beyond 2007, possibly beyond 2017, rather than building a 96 satellite system that will start operations in 2007 based on a 1997 design. The flexibility of today's GSO satellite technology was not envisioned by Iridium LLC when it filed its NGSO 2 GHz application in 1997. Having experienced the effort and investment necessary to develop a new mobile satellite service, Iridium is convinced that this inherent GSO flexibility is critical to preserving the utility, viability, and value of the substantial space assets and investment in a new 2 GHz MSS service.

Second, the primary system design driver was to maximize the limited amount of available spectrum resources.¹⁴ This was accomplished by two means: 1) the proposed GSO design offers twice the density of beams, translating into increased spectrum reuse, spectral efficiency and greater capacity for given regions; and 2) the proposed GSO fixed beam pattern provides greater flexibility to adapt resources across the coverage area. These improvements

¹⁴ It should be noted that Iridium LLC originally applied for authority to operate over the 1980-2025 MHz (uplink) and 2160-2200 MHz (downlink) bands (in the U.S. Iridium sought authority to operate in the 1990-2025 MHz and 2165-2200 MHz bands). It was ultimately authorized to operate in a segment of 3.5 MHz of spectrum in each direction of transmission.

allow additional capacity/bandwidth directed at unserved and underserved regions in the U.S. As shown in the technical descriptions included in this filing, the proposed GSO design includes a payload that employs extremely flexible, high gain beams and beam-switched processing—an approach that will allow Iridium to respond continuously to geographic shifts in traffic demands/distributions over the predicted 12 years of operation.¹⁵

Third, improvements in satellite technology now permit GSO satellites to offer the type of third-generation (3G) services previously only available by terrestrial services. The ability for satellites to provide 3G compatible services, over equipment similar to what terrestrial wireless consumers have come to enjoy, was certainly an objective of the original Iridium LLC proposal. However, at best Iridium LLC could only propose in 1997 that it would offer a range of services “consistent with current expectations for third-generation terrestrial wireless systems, including a variety of voice and data applications” and anticipate “that the MACROCELL system will be compatible with the overall objectives of FPLMTS/IMT-2000 and other third generation service concepts.”¹⁶ In the intervening six years, the capabilities of GSO platforms (e.g., large reflector antenna technology, onboard signal processing electronics, prime bus power technology) have advanced to the point where GSO satellites are now fully capable of provisioning 3G compatible services/features, at a service quality level (e.g., link margin) not previously possible. Thus, a GSO platform can now support a service/feature set and user experience that is equivalent to that which commercial mobile radio service (“CMRS”) users have come to expect – and will clearly expect when Iridium’s 2 GHz system is launched and

¹⁵ Indeed, Iridium believes that with the efficiency-enhancing technological advantages of Iridium’s proposed GSO 2 GHz satellite, as described herein, the addition of two to three similar next-generation satellites could easily facilitate full global coverage via such a GSO-based constellation.

¹⁶ *Iridium Application* at 3.

operational.¹⁷ This new GSO technology will allow the provisioning of 3G services in rural and underserved areas in an effective, convenient fashion. Rural and underserved area subscribers will be able to receive high-speed, broadband mobile-wireless services in small, battery efficient devices, something definitely not envisioned by Iridium LLC when it filed its 2 GHz application in 1997. Clearly, this result is in the public interest and cannot be adequately provided by the previously approved NGSO constellation.

Fourth, the in-orbit failure rate of Iridium's currently deployed Big LEO constellation is significantly lower than original expectations. Iridium initially anticipated that the first generation satellites would cease operations by 2006-2007. Extensive operational and Failure Mode and Effect Analysis (FMEA) data collected and analyzed over the past 2 years, however, shows that earlier lifetime predictions were extremely conservative. Indeed, Iridium now predicts that the existing Big LEO satellites will remain operational until at least 2013. The exceptional reliability and global service capabilities of the current generation system are technical developments that allow Iridium new flexibility to include advanced technology in its 2 GHz system without jeopardizing existing service to the public. They also allow Iridium to consider that the benefits of an NGSO system, including complete global coverage, will still be available to consumers through the Iridium System, so that the 2 GHz System can offer new, complementary services responsive to evolving technological and market developments.

Grant of this modification would conform to Commission policy favoring approval of applications for modifications that seek to incorporate technological advancements. For example, in January 1999, the Commission permitted Teledesic LLC to take advantage of

¹⁷ This conclusion is supported by technical data generated in support of the System Requirements Review (SRR) and Preliminary Design Review (PDR), which have enabled a thorough comparison of system costs, capabilities, lifetimes, and a side-by-side comparison of services and features supportable by the original NGSO design, and alternative GSO design.

“technological advances [made] since the system was initially designed.”¹⁸ More precisely, the International Bureau permitted Teledesic to modify its system in a number of ways, including changing orbital altitude and reducing the number of satellites by nearly two thirds from 840 NGSO satellites to 288 NGSO satellites.¹⁹ In March 2001, the Commission approved on similar grounds Sirius Satellite Radio Inc.’s (“Sirius”) modification application requesting authorization to operate three NGSO satellites in the 2320-2332.5 MHz band, rather than the two GSO satellites for which it was originally authorized.²⁰ In that case the FCC concluded that modification of Sirius’ satellite digital audio radio service system “is consistent with Commission policy to encourage technical innovation and spectrum efficiency in satellite design that will facilitate higher quality [service] for the U.S. consumers.”²¹ Similar approval is required here to allow Iridium to incorporate the technology improvements discussed above—particularly in light of the public interest benefits the proposed new technology will bring.

B. Iridium’s Use of Advanced Technology Will Bring Numerous Public Interest Benefits

Iridium’s proposal to use advanced technology that did not exist when Iridium’s predecessor initially conceived of a satellite low-Earth-orbit (“LEO”) network in the late 1990’s will serve the public interest. As noted in the technical portions of this application, Iridium

¹⁸ *Teledesic Modification Order*, 14 FCC Rcd at 2262-63.

¹⁹ *Id.* (permitting Teledesic to modify its system by: 1) decreasing the number of satellites from 840 to 288; 2) increasing the altitude to the 1375-1394 kilometer range; 3) decreasing the number of orbital planes to twelve and the number of satellites in each orbital plane to twenty-four; 3) decreasing the inclination of the orbital planes to 84 degrees; 4) adding emission designators; 5) adding optical inter-satellite links in addition to its radio frequency inter-satellite links; 6) changing its downlink modulation and 7) revising its uplink and downlink power budgets.)

²⁰ *Sirius Modification Order*, 16 FCC Rcd at 5429-30.

²¹ *Id.* at 5429.

proposes to use a high-powered geostationary satellite with a large antenna. This system design is a preferred alternative to the licensed 2 GHz NGSO system because of its many public interest benefits described below.

1. Smaller, Lighter Phones with Better Battery Power

First, this new GSO satellite technology allows smaller and, therefore, lighter user equipment while providing the same or better quality of service. The advantage of smaller equipment in the mobile telephony market is clear and proven. In terrestrial mobile services, the size of user equipment has shrunk while the market has expanded exponentially. Portability and mobility remain critical to satellite phone users. Second, user units will require less power to communicate with Iridium's proposed satellite because of its large antenna that provides greater received signal strength to the user equipment. The lower power demand on user equipment, in turn, leads to a longer battery life and less expensive subscriber equipment. This benefit is extremely critical in a market where users are often in remote areas lacking auxiliary power sources. Third, a GEO system is more cost-effective to design and deploy than an NGSO system, which in turn results in lower-priced services.

2. Increased Penetration and Extended Service Areas

The introduction of these first three consumer benefits—smaller phones, longer battery power and competitive pricing—will broaden the penetration and ubiquity of mobile satellite communications. Such ubiquitous coverage is extremely important and provides advanced wireless services in rural and underserved areas that do not have these services readily available. These communities have been bypassed by the communications revolution because of a lack of affordable telephony and data services. With its cost-effective network and lower-priced handsets and airtime, Iridium's next generation 2 GHz GSO system will deliver broadband mobile satellite services to a broad array of underserved markets and communities. This

approach will provide communications across communities that are too dispersed to justify the ground infrastructure of a traditional cellular system.

3. New and Improved Services

Iridium's proposed modified 2 GHz system will also expand existing MSS capabilities and improve service in existing markets. Ultimately, by coupling its currently operating "Big LEO" constellation with its new 2 GHz GSO system, Iridium will be able to keep pace with the consistently expanding demand for new and improved satellite-based communications while maintaining existing service. Users will not only be able to make calls from remote locations, as they can today, but they also will be able to share photos and check maps without experiencing signal loss as they move across their areas of operation, in and out of the view of satellites. An additional capability that Iridium has designed into its next generation satellite system is multicasting. This capability will allow Iridium to create new service applications for 3G mobile end-users and the automobile industry. Already there is a steady increase in the demand for data to cars and trucks for both industrial and consumer applications. Multicasting will also permit homeland defense end-user segment to send and receive time critical information.

4. Homeland Defense and Public Safety

The new functionality provided by a GEO system will benefit important government markets, such as homeland defense. Through its experience of working with the U.S. Government and its agencies, Iridium has garnered an excellent understanding of the requirements for homeland security and defense applications. The new satellite system will be designed with capabilities that allow these requirements to be addressed effectively.

There are several examples of applications that would benefit the homeland defense market. Closed user groups for Border Patrol is one example. U.S. borders run through thousands of miles of remote areas. This complicates the communication systems of agents who

need to maintain close coordination across a widespread area. In this market, next generation satellite transmission provides an excellent, cost-effective solution. Border agents would be able to work within secure closed user groups in the remote areas they patrol.²²

A similar scenario might play out at the nation's ports. Major ports are denominated by a busy centralized area with dispersed staging areas on both land and sea. As with the border control situation, this complicates the communication systems of the port authority, which needs to maintain close coordination across this widespread area. Again, satellites with faster throughput capabilities, which allows for the transfer of maps, photos and diagrams, provide an excellent communications solution.²³

A related approach might also be used to augment voice and data capabilities along the nation's air routes. Satellites with elevated data speeds can provide much needed connectivity to commercial and private aircraft and deliver information that cannot be effectively delivered by

²² Further, if Iridium implements ATC, a hybrid Satellite/ATC solution will extend these benefits. In densely populated areas, such as the border area around El Paso, Texas, Iridium might deploy a system that would include ground ATC towers and dual-mode handsets. While in and around El Paso, border agents would use ATC terrestrial communications. Meanwhile, in the more remote areas to the east and west border agents would rely on satellite communications. In addition, vehicle mounted pico cells could be deployed that would act as small ATC terrestrial repeaters. These pico cells would maintain a link to the satellites and allow agents to work near the vehicle but out of satellite coverage – for example in a building, tunnel or heavily foliated area. As a system, these tools would provide seamless ground and satellite communications so that the agents could remain in contact the entire time.

²³ With ATC, Iridium could again deploy a system which would include ground ATC towers and dual-mode handsets. While monitoring and inspecting ships in the central port, authorities would use ATC terrestrial communications. Meanwhile, in the more remote areas along the coast and on the ocean, agents would rely on satellite communications. Again, ship mounted pico cells could be deployed which would act as small ATC terrestrial repeaters. Like the vehicle units used in the earlier example, these pico cells would maintain a link to the satellites and allow agents to work in areas outside of satellite coverage – for example in the hold of a ship. As a system these tools would provide seamless ground and satellite communications so that the agents could remain in contact the entire time.

today's satellite systems.²⁴ Other public safety groups and first responders in emergency situations will also clearly benefit from these types of networks.

5. **FCC Precedent Favors Modifications that Enhance Service Offerings**

The Commission has granted modification requests in the past based on the applicant's desire to enhance and extend its suite of service offerings to consumers. For example, as noted above, the Commission has previously approved a modification application requesting authorization to operate three NGSO satellites in the 2320-2332.5 MHz band, rather than the two GSO satellites originally authorized.²⁵ There, the licensee sought modification in order to provide enhanced satellite DARS service to consumers. Similarly, in November 1996, the Commission approved TRW's request to modify its service link configuration to spread its bandwidth and polarization so that the licensee could improve the placement of its signal, thereby improving the scope and quality of service for its users.²⁶ Like these licensees, Iridium also seeks to modify its authorization in order to provide an improved service to the public.

C. **Iridium Will Satisfy All Milestones For its Modified System On Time**

The maturity of the technology chosen for Iridium's proposed GSO system will enable Iridium to satisfy all 2 GHz GSO milestone requirements *on time*. Iridium seeks Commission authority to launch and bring into operation its proposed GSO MSS network in accordance with

²⁴ Should Iridium decide to pursue ATC, a ground system in and around airports would handle voice traffic and the transfer of critical aircraft data. The result would be a seamless, integrated voice and data network for the nation's travelers and aircraft.

²⁵ *Sirius Modification Order*.

²⁶ *Application of TRW, Inc., Application For Modification of License in the Mobile Satellite service Above One GHz, Order and Authorization*, 11 FCC Rcd 20419 (1996) ("TRW Modification Order and Authorization")

the milestones imposed on 2 GHz MSS licensees using GSO satellites.²⁷ The modified milestones would be as follows:

Milestone	Deadline
Enter Non-contingent Satellite Manufacturing Contract	July 17, 2002
Complete Critical Design Review	July 17, 2003
Begin Physical Construction of Satellite	July 17, 2004
Complete Construction of Satellite and Launch it Into its Assigned Orbital Location	July 17, 2006
Certify Entire System Operational	July 17, 2007

These milestones are largely the same as Iridium's existing NGSO milestones. As the FCC recently acknowledged, "both NGSO licensees and GSO licensees are required to meet the same milestone schedule, except for commencement of physical construction and launch."²⁸ More precisely, licensees have 3 years to begin construction of all GSO satellites but only 2 ½ years to begin construction of all NGSO satellites. Licensees also have 5 years to complete construction and launch their first GSO satellite but only 3 ½ years to complete construction and launch the first two satellites in a multi-satellite NGSO constellation. GSO construction milestones are typically longer than NGSO milestones given the additional time required to develop and build a GSO satellite. Indeed, the FCC's recently approved generic milestones reflect this fact. There, as in the 2 GHz Order:

²⁷ *Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2GHz Band*, Report and Order, 15 FCC Rcd 16127, 16178-179 (2000) ("2 GHz MSS Order").

²⁸ *Amendment of the Commission's Space Station Licensing Rules and Mitigation of Orbital Debris*, First Report and Order and Further Notice of Proposed Rulemaking in IB Docket No. 02-34, and First Report and Order in IB Docket No. 02-54, FCC 03-102, at 70, ¶ 178 (rel. May 19, 2003) ("Satellite License Streamlining Order").

[T]he Commission observed that GSO satellite licensees need a longer period in which to launch their first satellite because individual GSO satellites may take more time to construct than an NGSO satellite within a larger constellation of technically identical satellites.²⁹

Accordingly, Iridium's compliance with the GSO milestones presents no delay beyond that which the FCC has already endorsed as technically required for licensees constructing GSO satellites. Indeed, the final milestone—system operation—is the same for both GSO and NGSO systems, and thus Iridium's compliance with the GSO milestones will not delay use of its authorized spectrum or delay service to the public.

Iridium is aware that the Commission required 2 GHz licensees to identify and request modifications "well in advance of the CDR milestone."³⁰ The FCC imposed this CDR milestone to serve a clear purpose:

[The] CDR milestone will aid us in assessing that prospective operators are taking immediate, concrete steps toward system implementation after meeting the first milestone, and allows us to identify any failure in system progress.³¹

While Iridium recognizes that the July 17, 2003 CDR milestone applicable to both NGSO and GSO 2 GHz systems is rapidly nearing, Iridium's progress toward implementing the GSO system proposed in this modification application satisfies the FCC's policy objective in requiring modifications well in advance of CDR. Iridium decided to change to a GSO system following completion in the first quarter of this year of a feasibility study for the licensed NGSO system. Since making that decision, Iridium has taken prompt action to develop its GSO proposal and file this modification application. For example, Iridium has amended its non-contingent satellite

²⁹ *Id.*

³⁰ *2 GHz MSS Order*, 15 FCC Rcd at 16178-79.

³¹ *Id.*; *Satellite Licensing Streamlining Order* at 74, ¶ 189.

contract with Boeing to reflect construction of the GSO MSS network described in this Modification Application. Boeing is also on track to complete CDR for Iridium's proposed 2 GHz GSO satellite by the July 17, 2003 deadline. The completion of the System Requirement Review ("SRR") and Preliminary Design Review ("PDR") are concrete steps already taken toward this end. Indeed, Iridium's system architecture change will not result in any delay in the provision of service—Iridium's original 2 GHz NGSO MSS system operational date and the 2 GHz MSS GSO system operational date are identical, i.e., July 17, 2007.³² Overall, Iridium's demonstrated commitment to proceed with a GSO 2 GHz MSS system and the fact that its proposed modified system will be operational at the same time as its currently-authorized system, should obviate any concern regarding the timing of this modification application.

Moreover, Commission precedent indicates that Iridium's completion of CDR for its proposed GSO satellite by July 17, 2003 satisfies the next milestone in its existing license.³³ In the *Teledesic Modification Memorandum Opinion and Order*, the Commission permitted Teledesic to satisfy its first milestone by filing a copy of a contract reflecting a system proposed in a pending modification application, not its authorized satellite system. In that case, the International Bureau found that the information "submitted by Teledesic demonstrates its intent to use the spectrum consistent with the stated policy objectives of the milestone requirement."³⁴ The bureau further indicated that it is more concerned that the licensee is committed to the

³² *Iridium Order*, 16 FCC Rcd at 13784. *2 GHz MSS Order* at 16178-79 (noting that the entire system, whether NGSO, GSO, or hybrid, must be launched and operational within six years of authorization).

³³ If necessary, Iridium will file a petition for declaratory ruling, milestone extension or waiver to confirm that completion of CDR for this proposed modified GSO system satisfies Iridium's milestone obligations.

³⁴ *Teledesic LLC, Application for Authority to Construct, Launch and Operate a Ka-band Satellite System in the Fixed Satellite Service*, Memorandum Opinion and Order, 17 FCC Rcd 11263, 11265 (2002) ("*Teledesic Milestone Order*").

completion of a system and that the proposed “plan does not allow for any significant delays.”³⁵ As noted, Iridium is committed to satisfying all milestones for its proposed modified system on time and its construction of the modified system will not result in any delay in operational status of its 2 GHz system.

The International Bureau also permitted Sirius to modify its system from GSO to NGSO after the first contract milestone had passed. Although, Sirius’ license did not contain an interim CDR milestone, the timing of Sirius’ modification is comparable to the timing of this modification request. Sirius filed its modification application 15 months following licensing and the Commission granted the modification almost 3 ½ years after issuance of the Sirius license—which was only 2 ½ years in advance of the system operation milestone.³⁶ In this case, Iridium is filing this modification request 22 months after licensing and a full 4 years in advance of the system operation date.

Moreover, Iridium’s proposed modification is distinguishable from Globalstar’s Application for Modification of its 2 GHz MSS system. In requesting a reduction in the number of its NGSO satellites in its 2 GHz MSS system, Globalstar sought an extension of its NGSO construction and launch milestone by 27 months and its NGSO system operation milestone by 24 months. The International Bureau concluded that Globalstar’s proposal would constitute an unacceptable delay in the use of the spectrum. Unlike Globalstar, Iridium is not retaining an NGSO component to its system and its entire new system will be operational by July 17, 2007 – the operational milestone for both GSO and NGSO 2 GHz MSS systems. There will be *no delay*

³⁵ *Id.* at 11266.

³⁶ Sirius filed its modification application on December 11, 1998. The International Bureau granted the modification application on March 9, 2001. The system operational milestone for the Sirius system is October 2003. *Sirius Modification Order*.

in service to the public and use of the proposed spectrum. Thus, Iridium's pursuit of a modified system at this time is consistent with Commission precedent and will still fulfill the Commission's goal of ensuring that 2 GHz MSS spectrum is utilized in a timely and efficient manner.

D. Iridium's Modified System Will Use Spectrum Efficiently and Will Not Increase Interference

Grant of Iridium's proposed modification also would advance the Commission policy objective of promoting the efficient use of the radio spectrum. When the Commission created its 2 GHz MSS rules, it found that, "there is adequate spectrum to accommodate both NGSO and GSO systems" and concluded both types of systems should be able "to compete in the marketplace to provide users with the best combination of services and prices."³⁷ Iridium's proposal to deploy a GSO system rather than a NGSO system comports with the Commission's policy of permitting both GSO and NGSO MSS networks to operate in the 2 GHz MSS bands.

In addition, Iridium's proposed modification will not increase interference to other users of the 2 GHz MSS band. The Commission authorized Iridium to operate in a specific segment of 2 GHz MSS spectrum, separate and apart from other 2 GHz MSS licensees. Iridium's proposed modified system will continue to respect the Commission's segregation of that spectrum. Furthermore, Iridium's conversion to a single GSO MSS design will not affect, from an interference perspective, terrestrial incumbents in the bands that are scheduled for relocation. MSPACE Analysis, as noted in attached Appendices, indicates that Iridium's proposed GSO system will not cause harmful interference to any other entity (See Appendix B). Finally, Iridium's proposed GSO system will also increase the amount of available spectrum for other users, as Iridium will no longer need spectrum for intersatellite links.

³⁷ 2 GHz MSS Order, 15 FCC Rcd at 16137, n. 64.

III. INFORMATION REQUIRED BY SECTIONS 25.114(a) AND (b) OF THE COMMISSION'S RULES

Pursuant to Section 25.114(a), Iridium is submitting a FCC Form 312, Main Form and this supporting material electronically via the International Bureau Filing System. Question 35 of FCC Form 312 requests a narrative statement regarding any waivers of the Commission's rules. That information is provided *infra* at Section IV, 25.114(c)(8).

Pursuant to Section 25.114(b), this application—consisting of an FCC Form 312 and this Application for Modification and Public Interest Determination—is a “concrete proposal” for Commission evaluation. Iridium notes that it will require new feederlink spectrum to support its proposed GSO system. However, the current “freeze” on applications for use of new frequency bands prevents Iridium from requesting new feederlink spectrum in this application.³⁸ Iridium intends to file an amendment to this application, or modification to any license granted pursuant to this application, that will seek authority to operate feederlinks and tracking, telemetry and command (“TT&C”) for its GSO network using 125 MHz of paired spectrum in the Planned Ku-band (10.825-10.95 GHz for downlinks and 125 MHz of bandwidth within 12.75-13.25 GHz band for uplinks). Iridium will apply for this spectrum as soon as the Commission lifts the “freeze” on the filing of requests for new spectrum assignments.

Iridium specifies its precise feederlink spectrum in this modification application in order to satisfy the requirement to provide a “concrete proposal” for Commission consideration.³⁹ In the 2 GHz context, the Commission noted that “[w]ithout a U.S. licensee with a concrete system

³⁸ *Satellite Licensing Streamlining Order* at 39, ¶ 89; *Commission Adopts Freeze on New Satellite License Applications*, Public Notice, DA 03-1284 (Apr. 25, 2003).

³⁹ 47 C.F.R. §25.114(b).

proposal, international coordination efforts for a U.S. system could be hindered."⁴⁰ Iridium's specification of the feederlinks at this time ensures that international coordination efforts can proceed on course. In addition, the FCC has noted that the requirement for applications to be "substantially complete" offers "protection against speculative satellite applications."⁴¹ In this case, Iridium's proven track record and demonstrated commitment to its modified 2 GHz system obviates any concern regarding the speculative nature or completeness of this application.

To the extent, however, that the International Bureau finds that this application does not satisfy the "concrete" system proposal standard, Iridium respectfully requests waiver of that requirement, or, alternatively of the FCC's "freeze" on applications for new satellite frequency assignments. The same public interest considerations supporting grant of this modification application provides good cause for waiver.⁴² Specifically, Iridium's modification seeks to take advantage of technological developments in order to bring improved MSS service to the public. Waiving any procedural impediments to this proposal thus serves the public interest better than strict adherence to the rules and policy in question.

IV. INFORMATION REQUIRED BY SECTION 25.114(c) OF THE COMMISSION'S RULES

25.114(c)(1) Name, Address, and Phone Numbers of Applicant

Iridium 2GHz LLC
1600 Wilson Boulevard
Suite 1000
Arlington, VA 22209
(703) 465-1000

⁴⁰ *Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5 MHz Frequency Bands*, Notice of Proposed Rulemaking, 9 FCC Red 1094, 1114 ("2 GHz MSS NPRM").

⁴¹ *Satellite Licensing Streamlining Order* at 93, ¶ 244.

⁴² 47 C.F.R. §1.3.

25.114(c)(2) Name, Address, and Phone Numbers of Contacts

Patricia A. Mahoney
Vice President, Regulatory & Spectrum Affairs
Iridium 2GHz LLC
1600 Wilson Boulevard
Suite 1000
Arlington, VA 22209
(703) 465-1000

Richard E. Wiley
Peter D. Shields
Jennifer D. Hindin
Wiley Rein & Fielding LLP
1776 K Street, NW
Washington, DC 20006
(202) 719-7000

25.114(c)(3) Authorization Requested

Iridium requests authority to modify the authorization provided by the Commission in Iridium's July 17, 2001 2 GHz MSS license to launch and operate a single satellite GSO MSS network, rather than the authorized 96-satellite NGSO MSS network. Iridium also requests authority to position its GSO spacecraft at the 87.5° west longitude orbital position, or some other available location within the 83° to 88° west longitude orbital arc. In order to permit this operation, Iridium requests authority to make other modifications to its authorized system, detailed herein.

25.114(c)(4) General Description of Overall System Facilities, Operations and Services

Iridium's modified 2 GHz MSS network will continue to offer a full range of voice and data services, consistent with, or superior to those same services identified in the 1997 NGSO application. At the time of launch, the proposed system will support services/features consistent with 3G terrestrial wireless systems, including medium to high data rates to support mobile voice, data, video, and multimedia communications, while allowing an upgrade path for

incorporation of future services/features. Figure 1 depicts the segments and major elements of the system architecture.

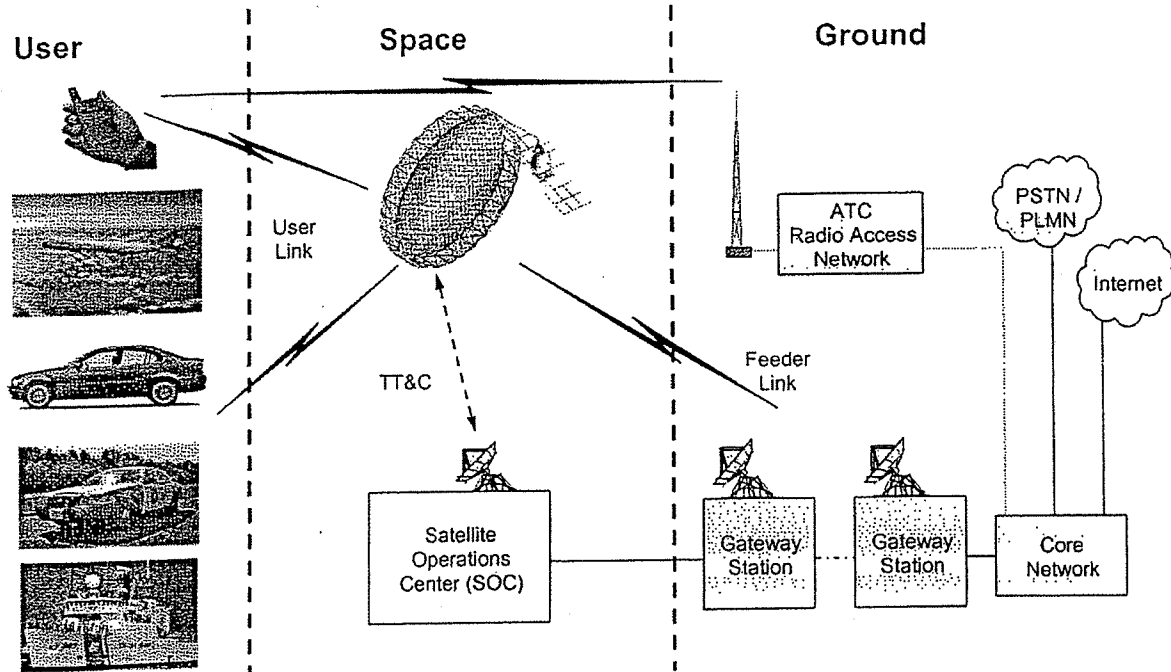


Figure 1 – Major Elements of the Iridium 2 GHz Network

The Iridium 2 GHz MSS system is comprised of three segments:

- The Space Segment consists of a GSO satellite and the associate Satellite Operations Center (SOC) that operates and maintains the GSO satellite via the Telemetry, Tracking and Command (TT&C) link. The GSO satellite will also support gateway-mobile and mobile-gateway-mobile communications.
- The Ground Segment consists of one or more earth stations and associated facilities that include the infrastructure for service distribution with terrestrial networks. A gateway (GW) provides access to the core network for originating and terminating communications or data connections with the user via the satellite. Each GW is assigned and manages a subset of the satellite resource but can request additional resources as required. The Core Network consists of the Network and Switching Subsystem as well as the Operation Subsystem. At the present time the integration of an ATC component is under consideration. If a decision is made to proceed, the ground subsystem will provide operational support to both the Ancillary Terrestrial Component (ATC) and GEO MSS Radio Segments. It may alternatively be incorporated into an existing carrier's infrastructure. The ATC would provide terrestrial cellular service to supplement

the MSS service in urban environments. A terrestrial cellular partner could also provide this service in parallel with their existing cellular or PCS services.

- The User Segment features a variety of subscriber units including personal communications handsets, PDAs, telematics terminals, maritime terminals, aeronautical terminals, civil communications handsets, as well as dual mode (satellite/terrestrial cellular compatible) user equipment.

25.114(c)(5) Spacecraft Communications Subsystems

5.1 Frequency and Polarization Plan

5.1.1 User-to-Satellite and Satellite-to-User Frequency Plan

The payload is designed with the capability to operate over a paired 20 MHz contiguous band (2000-2020 MHz uplink transmissions and 2180-2200 MHz downlink transmissions), which is the full 2 GHz MSS band allocation available in the United States.

An illustrative S-Band Frequency plan is shown in Figure 2. The system can be dynamically configured in orbit to use any portion of the 40 MHz of MSS spectrum. The signals from the return uplink antenna array will be routed onto the feeder link and the signals from the gateway uplink antenna will be routed to the MSS users. Each 20 MHz band is subdivided into 5 MHz sub-bands. Each sub-band is further channelized into as many as eight 120.2 KHz channels, four 1.25 MHz channels, a combination of a 1.25 MHz channel plus a 3.75 MHz or a single 5 MHz channel assignment. The S-Band frequency plan assumes the use of 5.0 MHz of spectrum in the 2 GHz MSS band, nominally positioned at 2005 to 2010 MHz for uplink transmission, and 2185 to 2190 MHz for downlink transmission, which is the second 5 MHz band segment from the lower of each frequency band.

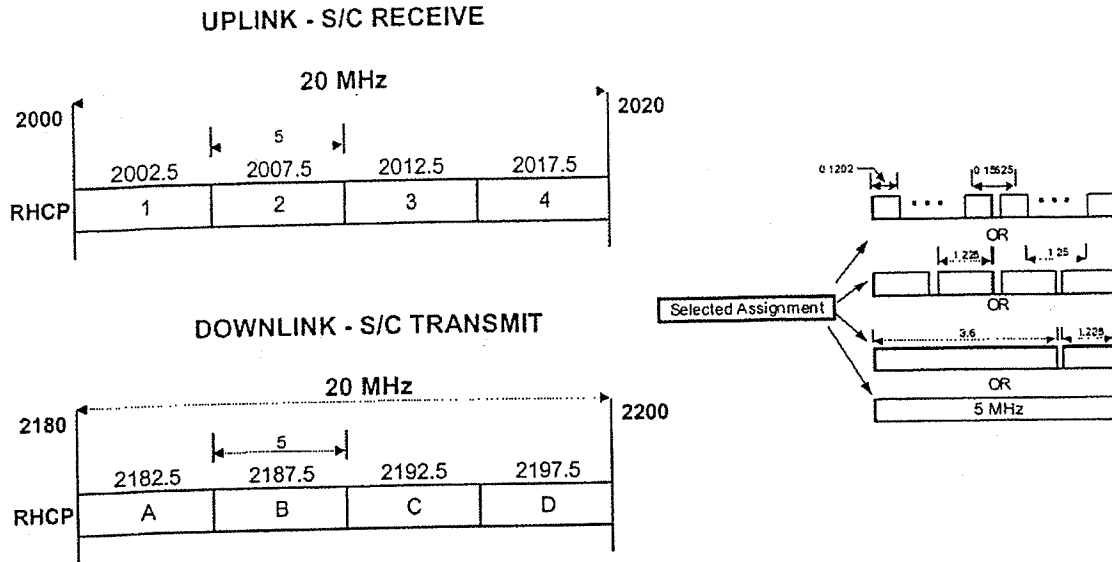


Figure 2: Illustrative S-Band Frequency Plan for 5.0 MHz Assignment and Selective Channelization

All user links will be fully compliant with all applicable FCC rules, along with the relevant technical and operational provisions adopted in the *2 GHz MSS Order*,⁴³ the *Global Mobile Personal Communications by Satellite Out-of-Band Emission Order*,⁴⁴ and the *Iridium Satellite 2 GHz MSS license*.⁴⁵ Appendix A provides additional technical details and link budgets for both the forward and return path user links.

5.1.2 Gateway-to-Satellite Frequency and Polarization Plan

For the Gateway-to-Satellite communication links, the feederlink frequency band and polarization plan is shown in Figure 3. The forward transponder processes ninety-two 1.25 MHz

⁴³ *2 GHz MSS Order*.

⁴⁴ *Amendment of Parts 2 and 25 to Implement the Global Mobile Personal Communications by Satellite (GMPCS) Memorandum of Understanding and Arrangements; Petition of the National Telecommunications and Information Administration to Amend Part 25 of the Commission's Rules to Establish Emission Limits for Mobile and Portable Earth Stations Operating in the 1610-1660.5 MHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 17 FCC Rcd 8903 (2002).

⁴⁵ *Iridium Order*.

feederlink segments per polarization. Assuming the operation of Iridium's Earth-to-Space feederlink is 125 MHz of bandwidth within the 12.75-13.25 GHz band, the segments of the feederlink would be within the 12.75-13.25 GHz band. Appendix A provides additional technical details and link budgets for both the forward and return path end-to-end user links.

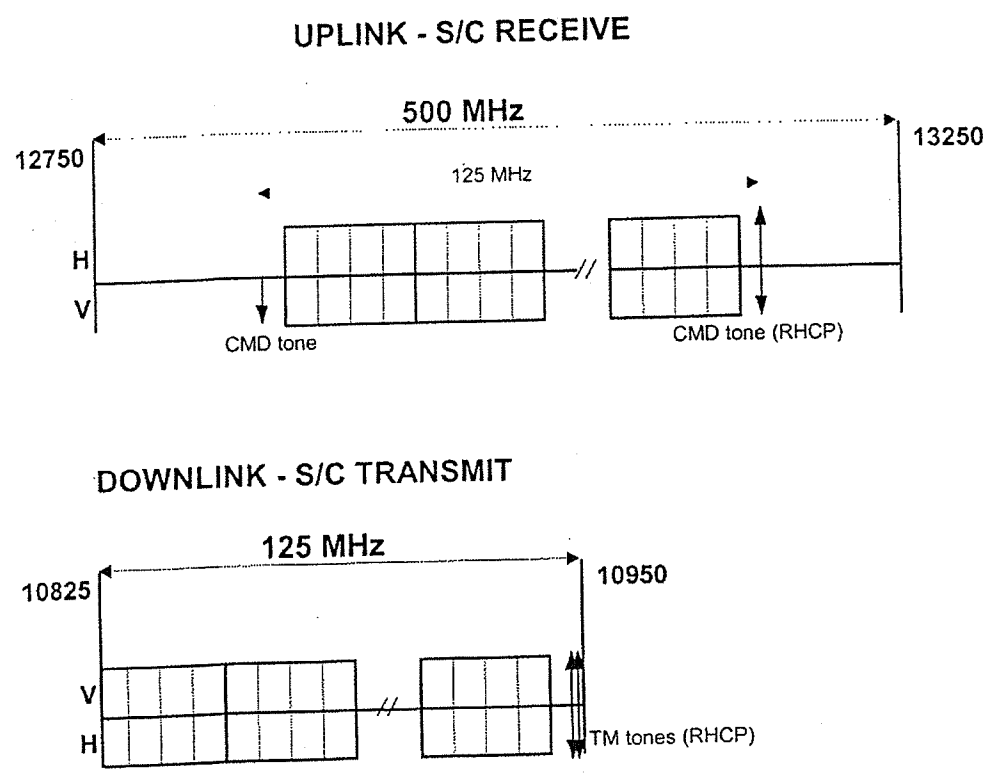


Figure 3: Feederlink Frequency Plan

5.1.3 Satellite-to-Gateway Frequency and Polarization Plan

For the Satellite-to-Gateway communication links, the feederlink frequency band and polarization plan is shown in Figure 3. The return transponder processes ninety-two 1.25 MHz feederlink segments per polarization. Assuming the operation of Iridium's Space-to-Earth feederlink is in the 10.825-10.95 GHz band, the segments of the feederlink would be centered beginning at the lower segment at 10825.625 MHz and extending equally spaced up to

10940.625 MHz. Appendix A provides additional technical details and link budgets for both the forward and return path end-to-end user links.

5.2 Emission Designators

The communications and TT&C signals will be phase modulated. User and gateway transmissions will share corresponding carrier frequencies using a CDMA scheme.

Table 1 – Emission Designators

Signal Types	Emission Designators
Communication Signals for User Terminals and Gateways	1M23G7WEC, 3M64G7WEC, 3M84G7WEC
Command, Ranging and Control	1M00F2D
Telemetry	125KG7D

5.3 Communications Payload

The communications subsystem includes all the necessary antennas, microwave transponder hardware and on-board processors to receive, amplify, configure and transmit microwave signals between user terminals and gateway earth stations. Services between the user terminals and gateways use S-band and Ku-band, respectively. These services include two-way voice and data transmission. Signals from the user terminals are routed via an S-band uplink to a feeder downlink to the appropriate gateway station. Signals from the gateway stations are transmitted to the satellite via a feederlink uplink and retransmitted to the user terminals via an S-band downlink.

The satellite communications subsystem block diagram is shown in Figure 4. The payload consists of a forward transponder (gateway-to-terminal) and a return transponder (terminal-to-gateway). The payload uses on-board digital beamforming and switching. The architecture provides the ability to allocate traffic to beams dynamically. New beams can be

dynamically created in-orbit by uploading different beam coefficients to the on-board digital beamforming network.

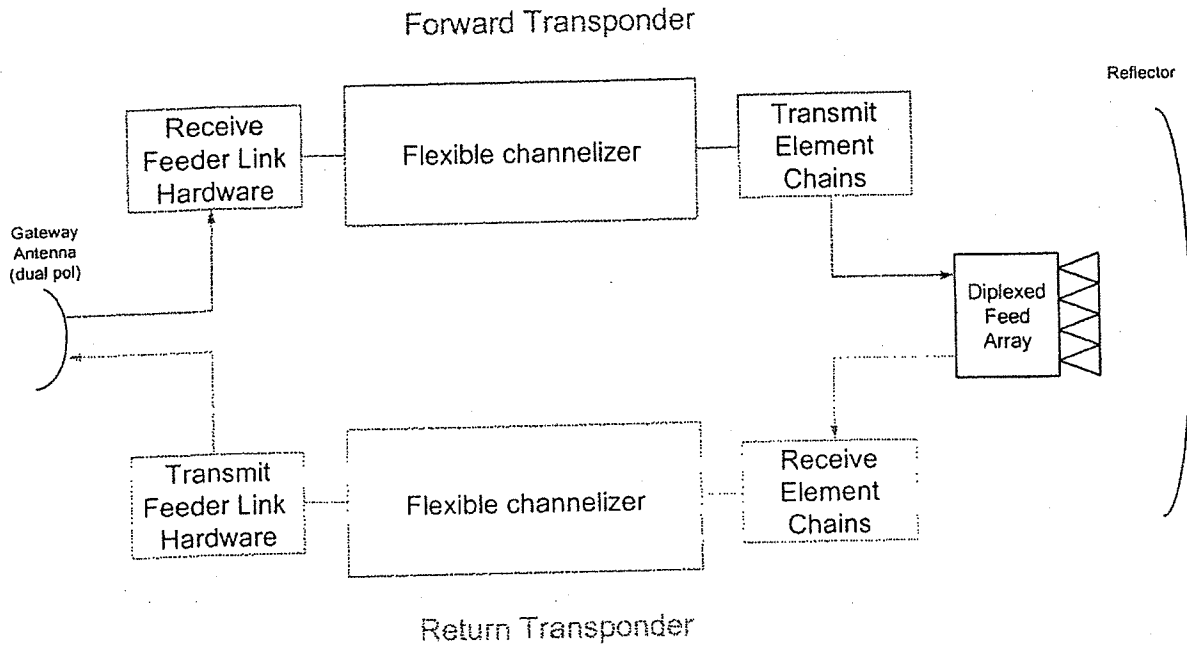


Figure 4 – Communication Payload Block Diagram

5.4 Tracking Telemetry and Command Payload

The TT&C function monitors the status of the spacecraft and alerts operators to any anomalous conditions that may occur. Use of spare components, station-keeping maneuvers, and other commands are accomplished through this function. The command link is a one-way link to the satellite from the SOC and is used to configure and control the satellite hardware. Two signal frequencies within the feeder uplink channelization plan have been designated for use as the satellite command link. The telemetry link is used to transmit spacecraft telemetry information from the spacecraft to the SOC. Two telemetry signal frequencies within the feeder downlink channelization plan have been designated for use as the satellite telemetry link.

5.5 Transponder Descriptions

5.5.1 Forward Transponder

In the forward link, signals destined for the user terminals are transmitted at Ku-band from the gateway stations to the satellite. After the feederlink antenna signals are amplified and filtered, they are downconverted and sent to the forward processor. In the forward processor, the signals are digitized and channelized where a beam weight is applied in the beamforming network. The output of the forward processor is a set of signals for the destination beam. These signals are amplified and routed through a hybrid matrix to the array feed.

5.5.2 Return Transponder

The satellite receives S-band transmissions in the return link from user terminals in the service area using a number of RF channels. The received signals are amplified and fed to the return processor. The return processor performs the reverse function of the forward processor.

25.114(c)(6) Orbital Locations and MSS Feederlink Frequencies

6.1 Orbital Requirements

To provide services to continental North America, maritime regions, and potentially regions of Central America and South America, Iridium requests Commission authority to operate its GSO satellite at the nominal 87.5° West Longitude orbital position, or at some other orbital position within the inclusive arc from 83° to 88° West Longitude. The exact orbital longitude will depend on the amount of Planned Ku-band feederlink spectrum Iridium can obtain in the Appendix 30B and domestic coordination processes.

Based on orbital assessments completed to date, Iridium is confident that at least one orbital position with sufficient Ku-band feederlink bandwidth will be available for use in the service area of the Iridium network. Table 2 provides a list of potential relevant Appendix 30B

Ku-band allotments and associated service areas. Appendix B of this Application includes a preliminary analysis of the 87.5° West Longitude orbital position.

Table 2 – Appendix 30B Ku-Band Allotments Within the 81.5W-88.8W Arc

Orbital Position	Associated Service Area
81.5° W	Paraguay
82.7° W	Venezuela
84.4° W	Nicaragua
85.4° W	Dominican Republic
85.7° W	Cape Verde
86.1° W	Uruguay
88.8° W	Peru

6.2 MSS Feederlink Frequencies

Iridium requests Commission authority to provide feederlinks for its 2 GHz MSS system of 125 MHz⁴⁶ of spectrum in each transmission direction within the Planned Ku-band (10.825-10.95 GHz in the Space-to Earth direction and 125 MHz of bandwidth within 12.75-13.25 GHz in the Earth-to-Space direction).

Appendix 30B of the International Telecommunication Union (“ITU”) Radio Regulations provides a plan for national satellite systems to access Fixed-Satellite Service (“FSS”) spectrum in GSO orbit. Additional uses other than “planned usage” are permitted, however, as defined in paragraph 2.6 of Article 2, Appendix 30B. Section III of Article 6, Appendix 30B provides a procedure to implement additional uses without causing harmful interference to allotments and assignments in the Plan and the List. If necessary, coordination agreements with affected administrations would be required.

⁴⁶ Iridium 2GHz LLC may request additional operating bandwidth of the Planned Ku-Band spectrum subject to availability of S-Band secondary spectrum allocations.

Iridium's proposed use of the Planned Ku-band for feederlinks is generally consistent with the Commission Table of Frequency Allocations. The Commission has allocated the 10.7-10.95 GHz and 11.2-11.45 GHz frequency bands to FSS (Space-to-Earth) on a co-primary basis with the Fixed Service.⁴⁷ The Commission has also allocated the 12.75-13.25 GHz frequency band to FSS (Earth-to-space) on a co-primary basis with the Fixed and Mobile Services.⁴⁸ Iridium requests in Section IV, 25.114(c)(8) of this Application a waiver of footnote NG104 of Section 2.106 of the Commission's rules, which limits FSS use of the band in the United States to international systems.⁴⁹

Iridium will protect terrestrial systems currently operating in the 12.75-13.25 GHz uplink band by coordinating its feederlink stations with those systems as required pursuant to Section 25.203(c) of the Commission's rules.⁵⁰ Toward this end, Comsearch has commenced a coordination analysis on Iridium's behalf. While this analysis is still ongoing, Iridium will use this information to identify acceptable locations for its feederlink stations, possibly through the use of interference mitigation techniques such as shielding to minimize interference to and from terrestrial systems. Additionally, in the 12.75-13.25 GHz band, Iridium will coordinate its feeder uplink operations with reception of the space research (deep space) (space-to-Earth) service at Goldstone, California (35°18 N, 116°54W), as necessary, in accordance with footnote US251 of the U.S. Table of Frequency Allocations.

⁴⁷ 47 C.F.R. §2.106 (2002).

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ 47 C.F.R. §25.203(c) (2002).

25.114(c)(7) Predicted Spacecraft Antenna Gain Contours

7.1 Service Link Antenna Gain Contours

The S-band antenna utilizes a 22-meter reflector fed by a multi-element feed array. The antenna can form up to 500 individual beams of variable sizes. For the baseline design, the beam centers will correspond to a hexagonal cell pattern and sidelobes will be optimized for a four cell reuse pattern. The contour plots of the representative S-band beams are provided in Appendix C.

7.2 Feederlink Antenna Gain Contours

The contour plot for the 1.4-meter Ku-band feederlink spacecraft antenna is provided in Appendix C.

25.114(c)(8) Service Description, Compliance with Service Rules, Waiver, Link Description and Typical User and Gateway Terminals

8.1 Service Description

There is no change in the service.

8.2 Compliance with Service Rules

Iridium's proposed GSO MSS network would operate in compliance with all of the Commission's rules for 2 GHz GSO MSS systems.

8.3 Waiver Request

Iridium seeks authority to operate TT&C and feederlinks for its GSO MSS network using 125 MHz of paired spectrum in the Planned Ku-band (10.825-10.95 GHz for downlinks and 125 MHz bandwidth within 12.75-13.25 GHz for uplinks). Footnote NG104 of Section 2.106 of the Commission's rules limits the use of the 10.7-11.7 GHz and 12.75-13.25 GHz bands by FSS networks to international systems.⁵¹

The Commission enforces this limit in order "to avoid ubiquitous deployment of FSS

⁵¹ 47 C.F.R. §2.106.

stations,”⁵² and to “limit the number of FSS earth stations with which the terrestrial fixed service would be required to coordinate.”⁵³ The Commission has observed, however, that the 10.7-11.7 GHz and 12.75-13.25 GHz bands may be appropriate “for possible use by GSO MSS feeder uplinks.”⁵⁴ This is because “[t]ypically, the number of GSO MSS feeder link earth stations is small, and may present fewer constraints for terrestrial systems . . .”⁵⁵

For example, in 1989 the Commission authorized American Mobile Satellite Corporation to use spectrum in portions of the 10.7-10.95 GHz and 12.75-13.25 GHz bands for its GSO MSS feederlink operations.⁵⁶ More recently, the Commission modified its restrictions on use of the band to permit NGSO FSS gateway earth stations to operate in the band. The Commission observed that one of the NGSO FSS applicants “anticipates operating between 30 and 40 earth stations in the United States in these frequency bands. In contrast, a GSO MSS system would likely require between one and six earth stations . . .”⁵⁷

Iridium anticipates that it will require Commission authorization for approximately two feederlink earth station facilities in the United States. Iridium will coordinate the placement of

⁵² *The Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, Notice of Proposed Rulemaking, IB Docket No. 99-81, 14 FCC Rcd 4843, 4867 (1999) (“2 GHz MSS NPRM”)

⁵³ *Assignment of Orbital Locations to Space Stations in the Domestic Fixed Satellite Service and the Applications of GE American Communications, Inc., for Modification of Authorizations to Construct, Launch and Operate Space Stations in the Fixed Satellite Service and for Special Temporary Authority to Test Space Station at 72° W.L.*, 15 FCC Rcd 3385, 3391 (1999).

⁵⁴ 2 GHz MSS NPRM, 14 FCC Rcd at 4867.

⁵⁵ *Id.*

⁵⁶ See *Land Mobile Satellite Service for the Provision of Various Common Carrier Services*, Memorandum Opinion, Order and Authorization, 4 FCC Rcd 6041, 6050 (1989), tentative decision on remand, 6 FCC Rcd 4900 (1991), final decision on remand, 7 FCC Rcd 266 (1992), *aff'd sub nom.*, *Aeronautical Radio, Inc. v. FCC*, 983 F.2d 275 (D.C. Cir. 1993).

⁵⁷ 2 GHz MSS NPRM, 14 FCC Rcd at 4867, n.107.

these earth stations with fixed and mobile service operations in the band in accordance with Section 25.203(c) of the Commission's rules. Therefore, the underlying purpose of the Commission's restriction on use of the 10.7-11.7 GHz and 12.75-13.25 GHz band would not be harmed by the grant of a waiver to Iridium. Furthermore, such a waiver would enable the deployment of Iridium's GSO MSS network without placing additional pressure on the already congested FSS allocations in the "conventional" portions of the C- and Ku-bands.⁵⁸ Accordingly, good cause exists to waive the Commission's rules in this case.

8.4 Link Performance

8.4.1 End-to-End Communication Link Performance

Representative link budget calculations for forward and return links for a digital voice signal have been provided in Appendix A. The link budget analyses show that communications links have adequate margins. The voice-only, terminal-to-terminal (or mobile-to-mobile) links will also have adequate link margins. The link budget computation consists of computing the end-to-end signal to total noise density ratio or $C/(N_o+I_o)$ for the link of interest and comparing this result to the threshold $C/(N_o+I_o)$, where threshold $C/(N_o+I_o)$ is defined to be the minimum value necessary to satisfy the desired bit error rate. Mobile link margin ("MLM") is defined as amount of additional link loss that may be incurred between the satellite and the user and still have an adequate end-to-end link margin. Iridium anticipates that the combination of link margin and modulation will provide sufficient penetration for quality service to small hand-held terminals located not only in clear line of sight, but also in vehicles and wooden structures.

It is assumed that the link is impaired by additive white Gaussian noise ("AWGN"),

⁵⁸ *Id.* at 4866 (noting that use of conventional C- and Ku-band frequencies for MSS feeder links would preclude conventional FSS services and inhibit the fungibility of these orbit locations for future FSS assignments).

interference due to gateway non-linearity, satellite non-linearity, adjacent channel interference, co-channel interference, cross-polarization interference and inter-system interference. The interference level used in each link budget computation is scenario dependent. Parameters that impact the interference level include: total number of service link frequency reuses, average transmit carrier power determined from the voice activity factor for voice service and duty factor for data service, and the service population mix.

8.4.2 Feederlink Performance

From a link budget perspective, the feederlink designs are typified by operations at a high C/N_0 and an AWGN channel. This is a result of the fact that the gateways have large directional antennas with high power amplifiers. For the link budget analysis, an eleven meter antenna ($G/T = 33.8$ dB/K) was assumed. A link budget analysis for end-to-end communications is provided in Appendix A.

8.4.3 Tracking, Telemetry and Command (TT&C) Performance

The TT&C link budgets are presented in Appendix A. Additional information on the TT&C operations of Iridium's 2 GHz MSS network are provided *supra* in Section 5.4.

8.5 Typical User Terminals

Iridium's typical user hand-held terminal ("HHTs") can transmit at up to -6 dBW EIRP and exhibit -28 dB/K G/T anywhere within the coverage region. These characteristics are consistent with terrestrial-based user equipment in such standards within the CDMA2000 standards. The user equipment form factor will mimic existing terrestrial handheld and vehicular terminals with the added satellite feature.

8.6 Baseline Gateway Facilities

Iridium anticipates that it will require the use of at least two gateway feederlink facilities in the United States. Iridium anticipates positioning one of the gateway facilities in Tempe,

Arizona, and another in Leesburg, Virginia. The specific location of Iridium's gateway facilities will be determined as a part of the 25.203(c) satellite earth station coordination process. The preliminary locations were chosen to capitalize on Iridium's present infrastructure in these locations. Iridium feederlink earth stations will typically employ an 11-meter antenna. Final antenna diameters will depend on, among other factors, desired availability, deployment rain zones, and actual spacecraft EIRP and G/T at the earth stations. A frequency plan for Iridium's feederlink earth stations is provided in Section IV, 25.114(c)(4) of this Application.

25.114(c)(9) Satellite Orbit Characteristics

The Iridium GSO MSS satellite will have the capability to maintain a longitudinal tolerance of 0.05° within its assigned orbital longitude as required by Section 25.210(j) of the Commission's rules.⁵⁹ Although Iridium intends to maintain its GSO satellite within a longitudinal tolerance of 0.05° , Iridium requests authority to operate with a greater North/South station keeping tolerance. Specifically, Iridium requests authority to operate the satellite with an initial North/South inclination of as much as six degrees before decreasing to about one degree over time. Iridium also requests authority to permit the satellite inclination to fluctuate naturally between about one and six degrees due to celestial forces during the life of the satellite.

To maintain a constant coverage area as the satellite orbit changes, the gateway periodically sends an updated beam weight to the on-board digital beam forming processor. Using this information, Iridium's satellite will automatically adjust its multiple-beam antenna patterns to position optimally the footprints over the desired service areas. Iridium's GSO satellite will operate in full compliance with the Commission's provisions on inclined orbit

⁵⁹ 47 C.F.R. §25.210(j) (2002).

satellite operations as specified in Section 25.280 of the Commission's rules.⁶⁰ During those periods in which Iridium's GSO satellite will operate at an inclination of up to 4.5°, Iridium's network will be protected fully from interference from NGSO FSS networks, as specified in the Commission's rules.⁶¹ Iridium will be able to operate its Ku-band feederlinks during periods in which Iridium's GSO satellite operates with an inclination of between 4.5° and 6°, in part through coordination of its GSO MSS feederlink operations with the gateway operations of licensed NGSO FSS operators.⁶²

25.114(c)(10) Power Flux Density Compliance

The ITU maintains GSO satellite downlink power flux density ("PFD") limits across the entire 10.7-11.7 GHz frequency band.⁶³ In contrast, the Commission's rules do not include PFD limits for GSO satellite downlink signals in the 10.7-10.95 GHz or the 11.2-11.45 GHz frequency bands. The Commission's rules do include PFD limits for GSO satellites operating in adjacent bands (10.95-11.2 GHz and 11.45-11.7 GHz), which are identical to the limits maintained by the ITU for the entire 10.7-11.7 GHz band. Tables 3 and 4 show the maximum PFD levels of Iridium's space-to-Earth feederlink and telemetry signals. As indicated, Iridium's downlink PFD levels are within the ITU PFD limits, along with the Commission's limits for the 10.95-11.2 GHz and 11.45-11.7 GHz bands. As a result, Iridium's system would provide identical levels of interference protection to U.S. terrestrial systems operating in the 10.825-

⁶⁰ 47 C.F.R. §25.280 (2002).

⁶¹ See *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, 16 FCC Rcd 4096, 4143-44 (2000) ("Ku-band NGSO FSS Allocation Order").

⁶² See *id.* (urging both NGSO and GSO operators to make good faith efforts to coordinate their respective operations).

⁶³ Article 21, Table S21-4, ITU Radio Regulations (Edition of 2001).

10.95 GHz band.

Table 3 – Feederlink Return PFD Compliance (10.825-10.95 GHz)

Maximum PFD limit (dBW/m ² /4kHz)	Elevation Angle (degrees)	Iridium 2GHz GSO MSS Maximum Power Flux Density (dBW/m ² /4kHz)	Margin (dB)
Eesburg, VA Facility			
-150	0	-174.6	24.6
-150	5	-174.5	24.5
-140	25	-169.2	34
-140	90	-183.5	43.5
Tempe, AZ Facility			
-150	0	-184.8	34.8
-150	5	-184.7	34.7
-140	25	-169.2	29.2
-140	90	-183.5	43.5

Table 4 – Satellite Telemetry PFD Compliance (10.825-10.95 GHz)

Maximum PFD limit (dBW/m ² /4kHz)	Elevation Angle (degrees)	Iridium 2GHz GSO MSS Maximum Power Flux Density (dBW/m ² /4kHz)	Margin (dB)
-150	0	-157.4	7.4
-150	5	-157.3	7.3
-140	25	-156.8	16.8
-140	90	-156.1	16.1

Additionally, Iridium intends to provide interference protection to Radio Astronomy operations in the 10.68-10.7 GHz frequency band as specified in footnotes US74 and US211 of the U.S. Table of Frequency Allocations.⁶⁴

⁶⁴ 47 C.F.R §2.106.

25.114(c)(11) Arrangements for Tracking, Telemetry and Control

The TT&C function monitors the status of the spacecraft and alerts operators to any anomalous conditions that may occur. Use of spare components, station-keeping maneuvers and other commands are accomplished through this function.

The command link is a one-way link to the satellite from the SOC and is used to configure and control the satellite hardware. Two signal frequencies within the feeder uplink spectrum have been designated for satellite command link use.

The telemetry link is used to transmit spacecraft telemetry information from the spacecraft to the SOC. Two telemetry signal frequencies within the feeder downlink spectrum have been designated for spacecraft telemetry link use.

25.114(c)(12) Physical Characteristics of the Satellite

12.1 Overall Spacecraft Characteristics

The satellite is based on a Boeing 702 design that is optimized for GEO-Mobile communications requirements for a 12-year service life with up to 6° inclined orbit operation. The design is compatible with a variety of the currently available launch vehicles.

The satellite will be designed to operate in the 87.5°W orbital arc. The exact orbital longitude, however, will depend on the amount of Planned Ku-band feederlink spectrum that can be obtained in the Appendix 30B and domestic coordination processes.

The GSO MSS satellite will have the capability to maintain a longitudinal tolerance of 0.05° within its assigned orbital longitude as required by Section 25.210(j) of the Commission's rules. Although Iridium intends to maintain its GSO satellite within a longitudinal tolerance of 0.05°, Iridium requests authority to operate with a greater North/South station keeping tolerance. Specifically, Iridium requests authority to operate the satellite with an initial North/South inclination of as much as six degrees before decreasing to about one degree over time. Iridium

also requests authority to permit the satellite inclination to fluctuate naturally between about one and six degrees due to celestial forces during the life of the satellite. The satellite consists of several integral subsystems. The satellite's power, propulsion, attitude control, structure, and thermal subsystems are described below. A depiction of the satellite is shown in Figure 5.

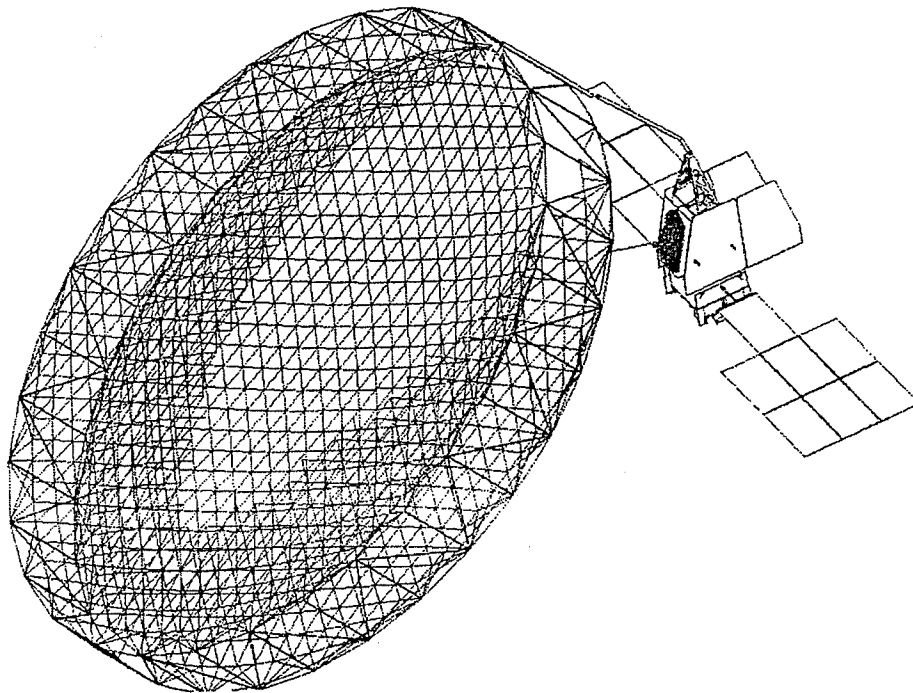


Figure 5 – Iridium 2 GHz MSS Satellite Depiction

Most of the major support systems are housed in the bus module: liquid propulsion, power electronics and batteries, attitude control electronics, and actuators. The solar array is connected to the bus module through the solar wing positioner mechanism.

The payload module houses the communications electronics and the telemetry and command RF components. The GEO-Mobile platform is designed to handle special payload accommodations including the large antenna feed structure, reflector stowage, signal processor support structure, and sufficient surface area for all payload units and deployable radiators. The

GEO-Mobile satellite will be about 35 meters in length and 27 meters in width, with its antennas and solar arrays deployed fully. The satellite mass statistics are provided in Table 5.

Table 5 – Satellite Mass Characteristics

Mass (kg)	
Payload	1750
<u>Bus</u>	<u>1570</u>
Dry mass	3320
Margin (5%)	165
<u>Fuel</u>	<u>2150</u>
Launch mass	5635

12.2 Attitude Control Subsystem

The attitude control subsystem (“ACS”) is composed of sensors, control actuators and the electronic equipment required to control the satellite at all times. This system is essentially the same as the existing design for the Boeing 702 GEO-Mobile product line.

12.3 Propulsion Subsystem

The liquid propulsion subsystem (LPS) is an integral bipropellant system. The propellant tanks provide capacity that enables the spacecraft to meet its service lifetime. In addition, thrusters provide the impulse necessary for 3-axis attitude control, East/West station keeping, station changes and deorbit maneuvers. The spacecraft can be deorbited to 300 km above GEO.

In addition, Xenon Ion Propulsion (XIPS) may be included for transfer orbit operations. The XIPS subsystem design has flight heritage from previous Boeing 702 satellites.

12.4 Electrical Power Subsystem

The electrical power subsystem (EPS) is designed to provide more than 16 kW of power at the end of life. Power generation is accomplished by two 7-panel solar arrays populated with high efficiency gallium arsenide (“GaAs”) solar cells. As shown in the power budget summary

(Table 6), there is ample solar array margin. When the solar array is shadowed a rechargeable 250 A-hr battery supplies full power to the spacecraft during eclipse.

Table 6 - Satellite Power Characteristics

Power (kW)	
Payload	13.0
<u>Bus</u>	<u>0.7</u>
Load power required	13.7
<u>Total power available</u>	<u>16.5</u>
Margin	17%

12.5 Thermal Control Subsystem

The thermal control subsystem provides a controlled thermal environment throughout the mission. The payload module thermal control subsystem utilizes a combination of fixed and deployable radiators. Heat is transported from the interior of the payload module to the fixed radiators through heat pipes. High dissipation bus electrical units are mounted directly on the bus radiators. The designs of the GEO-Mobile thermal control elements have extensive flight heritage.

25.114(c)(13) Financial Qualifications

See infra. Section IV, 25.114(c)(21).

25.114(c)(14) Request for Non-Common Carrier Status

In the original authorization, the Commission approved operation of Iridium's NGSO satellite system on a non-common carrier basis.⁶⁵ This treatment was consistent with the Commission's decision in the *2 GHz MSS Order* to treat the space segment component of 2 GHz MSS as non-common carriage. No change in this status is requested. A continuation of non-

⁶⁵ *Iridium Order*, 16 FCC Rcd at 13784.

common carrier status for the space segment of Iridium's proposed GSO satellite system is appropriate because the Commission did not differentiate between NGSO and GSO MSS systems when it decided to treat the space segment components of such systems as non-common carriage—its decision applied equally to all 2 GHz MSS satellite systems. In addition, Iridium's proposed GSO MSS system will continue to satisfy the two-prong *NARUC* standard used to determine if a space station operator should be treated as a common carrier: (1) whether there is or should be any legal compulsion to serve the public indifferently; or (2) whether the service is such that the provider is likely to hold itself out to serve indifferently all eligible users.⁶⁶ Iridium's proposed system will continue to satisfy the first prong because there remains a sufficient amount of satellite capacity available for others to enter the market, making the barriers to entry for new satellite operators low enough and the market competitive enough so as not to merit legal compulsion of Iridium to serve the public indifferently. The second prong is satisfied because Iridium will continue to use the spectrum to only offer space segment services and will not hold itself out to serve the public indifferently.

25.114(c)(15) Milestone Compliance

For a discussion of milestone compliance, as required by 47 C.F.R. § 25.114(c)(15), see Section II.C above.

25.114(c)(16) Public Interest Considerations

For a discussion of the relevant public interest considerations, as required by 47 C.F.R. § 25.114(c)(16), see Section II.B above.

25.114(c)(17) – 25.114(20)

Not applicable.

⁶⁶ *National Association of Regulatory Utility Commissioners v. FCC*, 525 F.2d. 630, 642 (D.C. Cir. 1976) ("*NARUC*").

25.114(c)(21) 2 GHz Mobile-Satellite Service Considerations (Section 25.143)

21.1 Legal Qualifications

Iridium's legal qualifications are demonstrated in the executed FCC Form 312 and associated exhibits included herein.

21.2 Technical Qualifications

Evidence of Iridium's technical qualifications is provided throughout this Application and its appendices.

21.3 MSS Geographic Coverage Requirements

Iridium's GSO network will be capable of providing MSS service on a continuous basis throughout the 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands to the extent that it is technically feasible.⁶⁷

21.4 Financial Qualifications

Financial qualifications do not apply to 2 GHz MSS licensees.⁶⁸ Moreover, in the *Satellite Licensing Streamlining Order*, the Commission eliminated its financial qualification requirement for all satellite license applicants.⁶⁹

21.5 Orbital Debris Mitigation

Iridium will utilize a satellite and launch vehicle design that minimizes the amount of debris released during normal operations. Iridium will also conduct analysis that demonstrates that no realistic failure modes exist or can lead to an accidental explosion during normal operations or before completion of post operations disposal.

⁶⁷ See 47 C.F.R. § 25.143(b)(2)(iv) (2001).

⁶⁸ 2 GHz MSS Order at 16150-52

⁶⁹ *Satellite Licensing Streamlining Order* at ¶ 161-65.

Iridium is unaware of any satellite network currently operating, or licensed to operate, at the requested nominal 87.5° W.L. orbital position, or within $\pm 0.35^\circ$ of this orbital location. Consequently, Iridium would be able to use the 87.5° degree W.L. orbital position without the need to coordinate its station-keeping operations actively with other existing (or currently planned) FCC licensees, thereby mitigating the risk of collision during normal mission life.

At the end of the operational life of the GSO satellite, Iridium will maneuver its spacecraft to a storage orbit consistent with Recommendation 3 of ITU-R S.1003 (1993), as currently in force, which calls for a disposal orbit with a minimum perigee at least 300 kilometers above a normal GSO operational orbit. Once the spacecraft has reached its final disposal orbit, all on-board sources of stored energy will be depleted or safely secured.⁷⁰

⁷⁰ In January 2003, Iridium filed a Request for Extension of time to submit its orbital debris mitigation plan. This Modification Application moots that pending Request.

V. CONCLUSION

Iridium respectfully requests that the Commission promptly grant Iridium's Application to modify its 2 GHz MSS system in order to deploy a GSO network.

Respectfully submitted,

By:  _____

Michael Deutschman
Chief Administrative Officer and Chief Counsel
Patricia A. Mahoney
Vice President, Regulatory & Spectrum Affairs
Iridium 2GHz LLC
1600 Wilson Boulevard, Suite 100
Arlington, VA 22209
703.465.1000

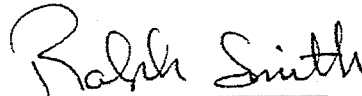
Richard E. Wiley
Peter D. Shields
Jennifer D. Hindin
Wiley Rein & Fielding LLP
1776 K Street, N.W.
Washington, DC 20006
202.719.7000

June 6, 2003

**CERTIFICATION OF PERSON RESPONSIBLE
FOR PREPARING ENGINEERING INFORMATION
SUBMITTED IN THE APPLICATION**

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this Application, along with attachments and exhibits; that I am familiar with Part 25 of the Commission's Rules; that I have either prepared or reviewed the engineering information submitted in this Application, attachments and exhibits; and that it is complete and accurate to the best of my knowledge.

By:



Ralph Smith

Vice President Satellite & Launch Operations
Iridium 2 GHz LLC

Date: June 6, 2003

Appendix A. Link Budgets

Return Link Budget	Units	Value	Value
		cdma2000	cdma2000
Standards		Voice	Voice
Mobile margin		12.51	12.45
System Information			
Satellite Orbit Position	deg W.L.	87.50	87.50
GW location		Tempe, Az	Leesburg, Va
Uplink (S-Band) Elevation Angle	deg	20.00	20.00
Downlink (Ku-Band) Elevation Angle	deg	42.90	43.70
Uplink (S-Band) Frequency	GHz	2.00	2.00
Downlink (Ku-Band) Frequency	GHz	10.95	10.95
Information Rate	kbps	4.80	4.80
Type of modulation	Name	BPSK	BPSK
Forward Error Correction	Info/Trans	1/4	1/4
Chip Rate (CDMA)	Mcps	1.23	1.23
Spread BW (CDMA)	MHz	1.23	1.23
USER EQUIPMENT PARAMETERS			
UE Effective EIRP	dBW	-6.0	-6.0
UPLINK (S-Band) PATH LOSSES			
Polarization Mismatch Loss	dB	0.00	0.00
Atmospheric Loss	dB	-0.06	-0.06
Rain Attenuation	dB	0.00	0.00
Cloud Attenuation	dB	0.00	0.00
Rain + Cloud Attenuation	dB	0.00	0.00
Scintillation	dB	-0.03	-0.03
RSS of rain+cloud & scint loss	dB	-0.03	-0.03
Free Space Loss	dB	-190.41	-190.41
U/L Propagation Losses	dB	-190.50	-190.50
SATELLITE RECEIVE PARAMETERS			
Satellite (S-Band) G/T	dB/K	23.0	23.0
UPLINK (S-Band) C/No (Thermal)			
UE Uplink EIRP	dBW	-6.00	-6.00
Mobile Loss (Margin)	dB	-12.51	-12.45
Propagation Losses	dB	-190.50	-190.50
Satellite Receive G/T	dB/K	23.00	23.00
Boltzman Constant	dBW/K-Hz	-228.60	-228.60
C/No Up	dB	-42.59	-42.65
UPLINK (S-Band) INTERFERENCE SUMMARY			
C/I (Adjacent Channel)	dB	-3.02	-3.02
C/I (Co-channel - Intra-beam only)	dB	-12.79	-12.79
C/I (Co-channel - Inter-beam only)	dB	-11.52	-11.52
Noise Bandwidth	dB-Hz	60.97	60.97
C/Io Up (Total)	dB	-45.51	-45.51

Return Link Budget (Continued)

SATELLITE TRANSMITTER PARAMETERS			
Ku-Band EIRP/Channel	dBW	10.00	10.00
DOWNLINK (Ku-Band) PATH LOSSES			
Free Space Loss	dB	-205.11	-205.10
Polarization Loss	dB	-0.70	-0.70
Atmospheric Loss	dB	-0.13	-0.15
Rain Attenuation	dB	-4.44	-6.67
Cloud Attenuation	dB	-0.14	-0.16
Rain + Cloud Attenuation	dB	-4.58	-6.83
Scintillation	dB	-0.14	-0.16
RSS of rain+cloud & scint loss	dB	-4.58	-6.83
Increase in Ant Noise Temp due to Rain Attn	dB	-1.73	-2.02
D/L (Ku-Band) Path Losses	dB	-212.25	-214.80
GATEWAY EQUIPMENT RECEIVE PARAMETERS			
Gateway Equipment Ku-Band G/T	dB/K	33.81	33.81
DOWNLINK (Ku-Band) C/N ₀ (Thermal)			
Downlink (Ku-Band) EIRP (per channel)	dBW	10.00	10.00
Downlink Path Loss	dB	-212.25	-214.80
Gateway Equipment Ku-Band G/T	dB/K	33.81	33.81
Boltzman Constant	dBW/K-Hz	-228.60	-228.60
C/No _{Down}	dB	60.16	57.61
DOWNLINK (Ku-Band) INTERFERENCE SUMMARY			
C/I (Co-Channel Interference)	dB	6.99	6.99
C/I (Adjacent Channel Interference)	dB	5.98	5.98
C/I (Cross-polarization Interference)	dB	14.91	14.91
C/I (Noise Interference)	dB	6.99	6.99
C/I (Adjacent System Interference)	dB	9.52	9.09
Noise Bandwidth	dBHz	60.97	60.97
C/I _o Dn	dB	61.96	61.89
LINK SUMMARY			
Total C/No (Uplink S-band Thermal)	dB-Hz	42.59	42.65
Total C/No (Downlink Ku-Band Thermal)	dB-Hz	60.16	57.61
Total C/I _o (Uplink S-Band Interference)	dB-Hz	45.51	45.51
Total C/I _o (Downlink Ku-band Interference)	dB-Hz	61.96	61.89
Total C/(No+I _o)	dB-Hz	40.71	40.71
Received Eb/No (not including degradations)	dB	3.90	3.90
Intra System Degradation	dB	0.00	0.00
Receiver Eb/No	dB	3.90	3.90
Required Eb/No	dB	3.90	3.90
Link Margin	dB	0.0	0.0

Forward Link Budget

Standards	Units	Value	
		cdma2000	cdma2000
		Voice	Voice
Service		15.00	15.00
Mobile margin			
GEOMETRY, FREQUENCY, DATA RATES			
Satellite Orbit Position	deg W.L.	87.5	87.5
GW location		Tempe. Az	Leesburg, Va
Uplink Elevation Angle	deg	42.90	43.70
Downlink Elevation	deg	20.00	20.00
(Ku) Uplink Frequency	GHz	13.25	13.25
(S) Downlink Frequency	GHz	2.19	2.19
Information Rate	kbps	4.80	4.80
Type of modulation	Name	QPSK	QPSK
Forward Error Correction	Info/Trans	1/4	1/4
Chip Rate (CDMA)	Mcps	1.23	1.23
Spread BW (CDMA)	MHz	1.23	1.23
GATEWAY EIRP			
Effective U/L (Ku-band) EIRP/Channel per User	dBW	29.38	29.38
UPLINK (Ku) PATH LOSSES			
U/L (Ku) Propagation Losses	dB	-206.38	-206.37
SATELLITE KU-BAND RECEIVE PARAMETERS			
Ku-Band G/T (EOB)	dB/K	7.00	7.00
UPLINK (Ku-Band) FEEDERLINK (ONV Terminal)			
Uplink (Ku-band) EIRP	dBw	29.38	29.38
Propagation Losses	dB	-206.38	-206.37
Satellite Receive G/T	dB/*K	7.00	7.00
Boltzman Constant	dBW/K-Hz	-228.60	-228.60
C/N ₀ Up	dB	58.60	58.61
UPLINK (Ku-Band) INTERFERENCE SUMMARY			
C/I (Adjacent Channel)	dB	-6.97	-6.97
C/I (Inter-Modulation)	dB	3.04	3.04
C/I (Crosspolarization)	dB	9.37	9.37
C/I (Adjacent System Interference)	dB	-0.50	-0.50
Noise Bandwidth	dBHz	60.97	60.97
C/I ₀ Up (Total)	dB	52.70	52.70

Forward Link Budget (Continued)

SATELLITE TRANSMITTER PARAMETERS			
D/L S-Band EIRP/User	dBW	49.65	49.65
DOWNLINK (S-Band) PATH LOSSES			
Free Space Loss	dB	-191.17	-191.17
Atmospheric Loss	dB	-0.08	-0.08
Rain Attenuation	dB	0.00	0.00
Cloud Attenuation	dB	0.00	0.00
Rain + Cloud Attenuation	dB	0.00	0.00
Scintillation	dB	-0.04	-0.04
RSS of rain+cloud & scint loss	dB	-0.04	-0.04
Polarization Mismatch Loss	dB	0.00	0.00
D/L (S-Band) Propagation Losses	dB	-191.29	-191.29
USER EQUIPMENT RECEIVER PARAMETERS			
UT Effective G/T	dB/K	-28.00	-28.00
S-BAND DOWNLINK (MOBILE LINK) C/N (Thermal)			
Downlink (S-Band) EIRP (per User)	dBw	49.65	49.65
Mobile Loss (Margin)	dB	-15.00	-15.00
Downlink (S-Band) Path Loss	dB	-191.29	-191.29
User Equipment effective G/T	dB/K	-28.00	-28.00
Boltzman Constant	dBW/K-Hz	-228.60	-228.60
C/No_Down	dB	43.95	43.95
DOWNLINK (S-Band) INTERFERENCE SUMMARY			
C/I (SC IM)	dB	6.99	6.99
C/I (Co-Channel inter-beam)	dB	-11.52	-11.52
C/I (Adjacent Channel Interference)	dB	5.98	5.98
Total C/I_Dn	dB	-11.65	-11.65
Noise Bandwidth	dBHz	60.97	60.97
C/lo_Dn	dB	49.32	49.32
LINK SUMMARY			
Total C/No (Uplink Ku-Band Thermal)	dB-Hz	58.60	58.61
Total C/No (Downlink S-Band Thermal)	dB-Hz	43.95	43.95
Total C/lo (Uplink Ku-Band Interference)	dB-Hz	52.70	52.70
Total C/lo (Downlink S-Band Interference)	dB-Hz	49.32	49.32
Total C/(No+lo)	dB-Hz	42.31	42.31
Received Eb/No (not including degradations)	dB	5.50	5.50
C/lo (CDMA intracell Degradation)	dB	1.00	1.00
Intra System Degradation	dB	0.00	0.00
Receiver Eb/No	dB	4.50	4.50
Required Eb/No (10E-3 BER, Voice)	dB	4.50	4.50
Link Margin	dB	0.00	0.00

TT&C Links

COMMAND	
(Faded)	
	SPOT
Frequency, MHz	13,250
Range, km	37,467
Uplink EIRP, dBW	90.0
Range loss, dB/m ²	-162.5
Rain Fade	-2.0
Scintillation	-0.2
Co-polarization Inclined Orbit Mismatch	-0.1
Tracking for Gain	-0.3
PFD, dBW/m ²	-75.1
Required PFD, dBW/m ²	-100.0
Link Margin, dB	24.9
TELEMETRY	
(Faded)	
	SPOT
Frequency, MHz	10,950
Range, km	37,467
TLM EIRP, dBW	6.0
Range loss, dB/m ²	-162.5
Rain Fade	-1.2
Scintillation	-0.2
Co-polarization Inclined Orbit Mismatch	-0.1
Tracking for Gain	-0.1
Isotropic gain, dB	-42.6
Clear Sky GS Antenna G/T, dB/K	33.8
G/T Degradation Due to Fade, dB	-1.2
Boltzmans, dBW/Hz/K	228.6
Received C/No, dB Hz	60.6
Received C/lo, dB Hz	60.6
Received C/No+lo, dB Hz	57.6
TM DATA RECOVERY	
Data Rate, kbps	4
TM Mod Index, radians	0.9
Data Rate, dB Hz	36.0
Mod loss, dB	3.9
Implementation loss, dB	3.0
Theoretical Eb/No (BER 1E-6), dB	10.8
Required C/No, dB Hz	53.7
Faded Margin, dB	3.8

Appendix B. Appendix 30B Preliminary Interference Analysis

For illustrative purposes, Iridium herein provides a preliminary interference analysis of a potential orbital position using feederlink spectrum in each transmission direction in the planned Ku-band (10.7-10.95 GHz, 11.2-11.45 GHz, and 12.75-13.25 GHz). The test position is the 87.5° W.L. orbital position.

Using input parameters from Table B.1 for the Iridium spot Ku-band feederlink beam,⁷¹ Iridium performed an MSPACE analysis⁷² based on an ITU Appendix 30B Ku-band reference database.⁷³ With the addition of the Iridium beam, some reference database beams, particularly those that had experienced aggregate carrier-to-interference ratios less than 26 dB, experience minor degradation in carrier-to-interference ratios. Iridium believes satisfactory agreements can be obtained from affected administrations by resolving these minor interference situations with a number of interference mitigation techniques, such as judicious site selection and the use by Iridium of large feederlink antennas.

⁷¹ The spot beams, defined covers regions consistent with antenna contours in Appendix C of this document.

⁷² MSPACEg, version 2.0, International Telecommunication Union, Radiocommunication Bureau, March 2002.

⁷³ Appendix 30B Ku-band reference database is ALOT14AE made from inpRS31K.txt and inpRS31K.ref after recording in the List of allotment SEY00000 (SEYSAT-1B network), "WARC ORB 88 FSS Plan in the 13/10-11 GHz band," Appendix 30B [RS32K], <http://www.itu.int/itu-r/space/plans/ap30b/index.html>, May 17, 2002

Table B.1- Table of Assumed Values for Selected MSPACE Parameters in Appendix 30B

FSS Plan Analysis

MSPACE Parameter	Parameter Value(s)
Orbital Longitude (Slot)	-87.5° (87.5° W.L.)
Western Service Arc	-97°
Eastern Service Arc	-77°
Western Predetermined Arc (PDA)	-97°
Eastern PDA	-77°
Sat Rx On-Axis Gain	45.0 dBi
Satellite Rx Noise Temp	917K
Sat Ant Pointing Error	0.1°
Sat Ant Rotational Error	1.0°
Sat E/W Stnkeep Error	0.10° (nominal), 0.20° (effective value - actually used in runs)
Satellite beam characteristics (Tx/Rx)	Using shaped beam data Boresights: @test points (see below)
E/S Antenna Efficiency	65%
E/S Antenna Diameter	11 m
E/S Tx On-Axis Gain	61.7 dBi
E/S Tx Sidelobe Gain	27.0 dBi
E/S Tx Peak Input Pwr to Antenna (aggregate)	15.3 dBW
E/S Tx pwr density	-72.1 dBW/Hz
Uplink Frequency (threshold for high-density carriers)	13.25 GHz
MSPACE uplink test points (1 per beam)	Test points placed at beam boresights: Tempe, AZ: 33.31N, 111.84W Leesburg, VA: 38.49N, 77.25W
Sat Tx On-Axis Gain	42.5 dBi
E/S Rx Noise Temp	435K
E/S Rx On-Axis Gain	60.2 dBi
E/S Rx Sidelobe Gain	27.0 dBi
Sat Tx Peak Input Pwr	16.0 dBW
Sat Tx pwr density	-69.3 dBW/Hz
Downlink Frequency (threshold for high-density carriers)	11.45 GHz
MSPACE downlink test points (1 per beam)	Test points placed at beam boresights: Tempe, AZ: 33.28N, 111.94W Leesburg, VA: 38.51N, 77.11W

Appendix C. Satellite Service Areas and Antenna Coverage

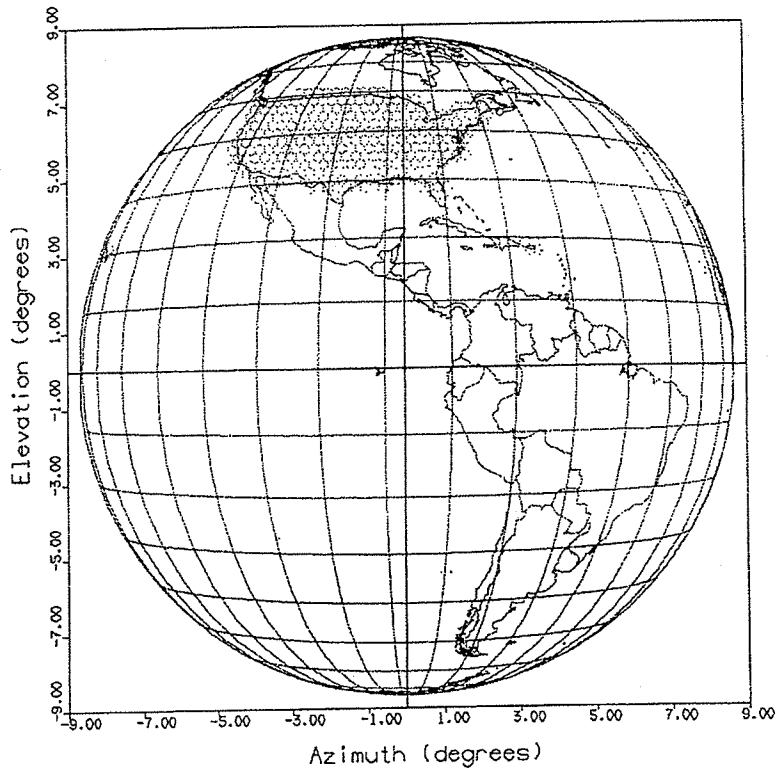


Figure 1 - Illustrative Mobile Service Area and Cell Pattern

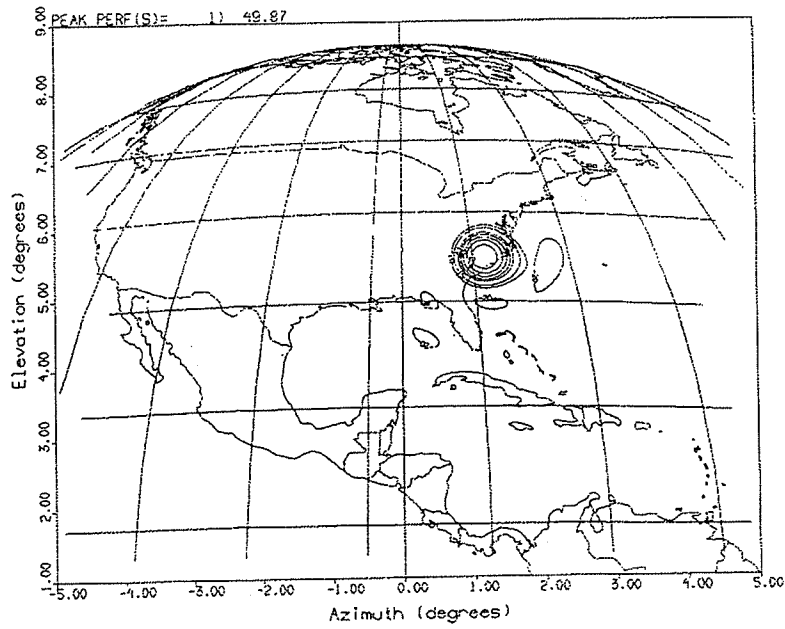


Figure 2 - Illustrative Antenna Beam Pattern for an Eastern Seaboard Beam

(Maximum antenna gain is 49.87 dBi)

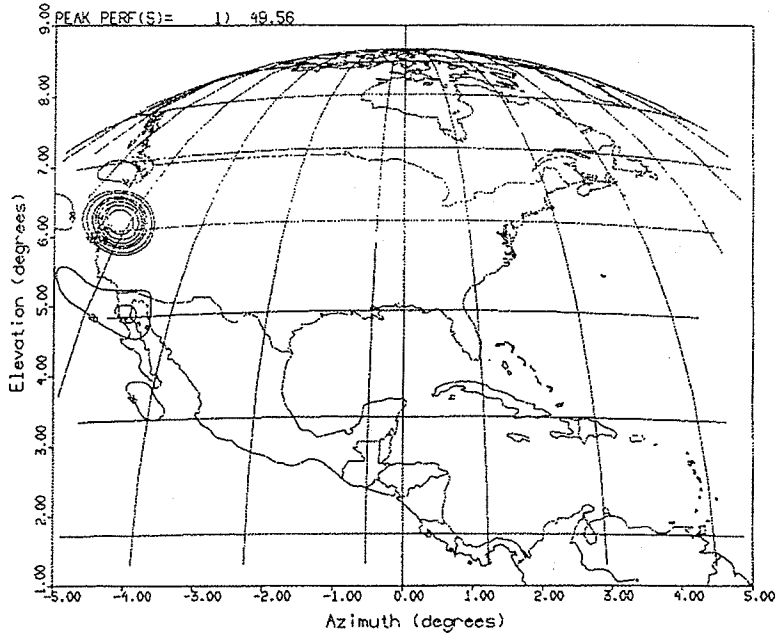


Figure 3 - Illustrative Antenna Beam Pattern for a Western Seaboard Beam

(Maximum antenna gain is 49.56 dBi)

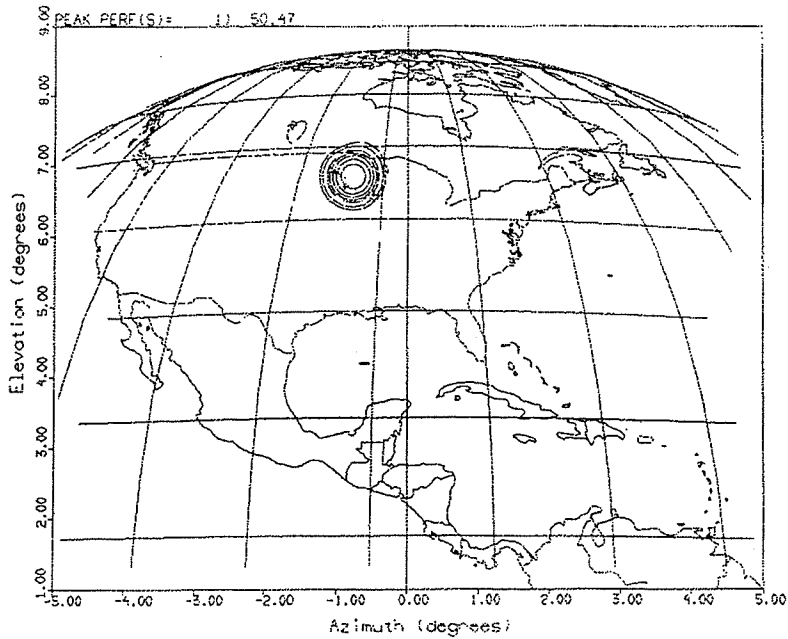


Figure 4 - Illustrative Antenna Beam Pattern for a Mid-CONUS Beam (Maximum antenna gain is 50.47 dBi)

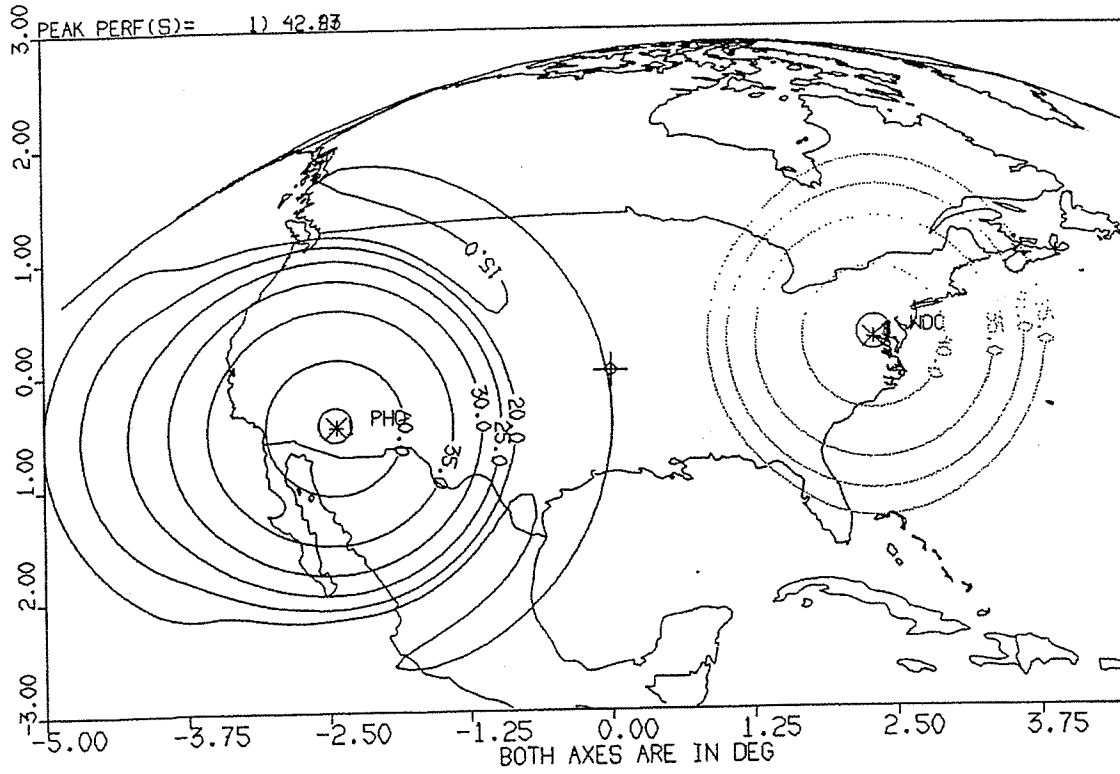


Figure 5 - Illustrative Ku-Band Feederlink Antenna Beam Pattern Coverage (Maximum antenna gain is 42.47 dBi)

Appendix D. Appendix 30B Notice

In accordance with Section III of Article 6, Appendix 30B, Iridium herein provides Annex 2 information on its requested additional uses as defined in paragraph 2.6 of Article 2, Appendix 30B. Presently there is no established format for the Annex 2 information of Appendix 30B. Furthermore, ITU Space Capture software has no provisions to permit the electronic submission of Appendix 30B notices. The format below follows the order of Annex 2B to Appendix 4 of the ITU Radio Regulations, as revised according to Corrigendum 1 to Circular Letter CR/158.⁷⁴

Item number	Item Description	Item Value	Comments
A.1	Identity of the satellite network or earth station	--	
A.1.a	Identity of the satellite network	USASATyy	
A.1.d	Country	United States of America	
	Allotment identification, or, for network not derived from the Allotment Plan, the identity of the satellite network	USASATyy	
A.1.f	Country symbol of the notifying administration	USA	
A.2.a	Date of bringing the frequency assignment into use	FCC amendment acceptance date + 5 years	
A.4	Orbital information	--	
A.4.a.1	Nominal longitude on the geostationary-satellite orbit	87.5° W	
A.4.a.2	Planned longitudinal tolerance	+/- 0.05°	
	Planned inclination excursion	+/- 6°	
A.4.a.4	Service arc	77° W - 97° W	PDA ±10° from slot
A.5	Coordination: administrations	None	

⁷⁴ Corrigendum 1 to Circular letter CR/158, "Required Appendix 4 data elements for the submission of information to the Radiocommunication Bureau under Appendices 30, 30A and 30B," Radiocommunication Bureau, International Telecommunication Union, March 15, 2002.

	with which coordination has been successfully completed or coordination is sought		
A.6	Agreements with other administrations	None	
A.18	Subregional system type, administrations, and allotments	Not applicable	

(FORWARD LINK) (Earth-to-space)

B	Characteristics to be provided for each satellite antenna beam or each earth station antenna	--	
B.1	Designation of satellite antenna beam; include steerable or reconfigurable designation as last character "R"	RG	
B.2	Transmission/reception indicator	R = reception	
B.3	Geostationary space station antenna characteristics	--	
B.3.d	Pointing accuracy of the antenna	0.1°	
B.3.g.1	Maximum co-polar gain (dBi)	45.0	
B.3.g.5	For beams of other than elliptical shape, co-polar gain contours at -2, -4, -6, -10, -20, and 10 dB intervals thereafter down to 0 dBi Beam aimpoint longitude and latitude For steerable beams, the maximum antenna gain and the effective antenna gain contours	Figure X 111.8° W, 33.3° N 77.3° W, 38.5° N Not applicable	Nominal aimpoints; this is a shaped beam.

(FORWARD LINK) (Earth-to-space)

C	Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna	--	Characteristics of groups of frequency assignments for beam RG.
C.1	Frequency range for each Earth-to-space or space-to-Earth service area	12.75-13.25 GHz	125MHz occupied bandwidth within frequency range
C.5.a	Receiving system noise temperature (lowest - for a space station this is referred to the output of the receiving space station antenna)	Group 1: 917° K	

C.8	Power characteristics of the transmission	--	
C.8.j	Maximum power density (dBW/Hz) averaged over the necessary bandwidth supplied to the input to the antenna; Frequency below which signals whose peak-to-average ratio is less than 5 dB will be located; Maximum power density (dBW/Hz) averaged over the worst 4 kHz band, supplied to the antenna input.	Group 1: -72.1 Group 1: 13.25 GHz Group 1: -72.1	
C.10	Type and identity of the associated station(s). (This may be another space station, a typical earth station of the network or a specific earth station.)	Typical earth station Identity: TYPICAL-11M	
C.10.c.2	Maximum isotropic gain (dBi)	61.7	
C.10.c.3	Half-power beamwidth (deg)	0.12	
C.10.c.4	Reference radiation pattern	27 – 25LOG(FI)	Verify w/ Vertex
C.10.c.5	Lowest total receiving system noise temperature, referred to the output of the receiving antenna of the earth station under clear-sky conditions, when the associated station is a receiving earth station.	Not applicable	This associated earth station is a transmitting earth station for beam RG.

(FORWARD LINK) (Earth-to-space)

C.11.b	<p>Service area identified by a maximum of 20 test points and a service area contour or by a minimum elevation angle for transmitting space stations.</p> <p>Service area identified by a maximum of 20 test points and a service area contour or by a minimum elevation angle for receiving space stations.</p>	<p>Not applicable</p> <p>(33.31, -111.84) (38.49, -77.25); Service area is shown within the -3 dB contours of each beam in Figure X.</p>	Points given as (°N, °E)
C.12	Minimum required protection ratio, if less than 26 dB	Not applicable	

(RETURN LINK) (space-to-Earth)

B	Characteristics to be provided for each satellite antenna beam or each earth station antenna	--	
B.1	Designation of satellite antenna beam; include steerable or reconfigurable designation as last character "R"	TG	
B.2	Transmission/reception indicator	T = transmission	
B.3	Geostationary space station antenna characteristics	--	
B.3.d	Pointing accuracy of the antenna	0.1°	
B.3.g.1	Maximum co-polar gain (dBi)	42.5 dBi	
B.3.g.5	<p>For beams of other than elliptical shape, co-polar gain contours at -2, -4, -6, -10, -20, and 10 dB intervals thereafter down to 0 dBi</p> <p>Beam aimpoint longitude and latitude</p> <p>For steerable beams, the maximum antenna gain and the effective antenna gain contours</p>	<p>Figure Y</p> <p>111.9° W, 33.3° N 77.1° W, 38.5° N</p> <p>Not applicable</p>	Nominal aimpoints; this is a shaped beam.

(RETURN LINK) (space-to-Earth)

C	Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna	--	Characteristics of groups of frequency assignments for beam TG.
C.1	Frequency range for each Earth-to-space or space-to-Earth service area	10.825-10.95 GHz	This range applies to all service areas.
C.5.a	Receiving system noise temperature (lowest - for a space station this is referred to the output of the receiving space station antenna)	Not applicable	Space station transmits in these bands

C.8	Power characteristics of the transmission	--	
C.8.j	Maximum power density (dBW/Hz) averaged over the necessary bandwidth supplied to the input to the antenna; Frequency below which signals whose peak-to-average ratio is less than 5 dB will be located; Maximum power density (dBW/Hz) averaged over the worst 4 kHz band, supplied to the antenna input.	Group 1: -69.3 Group 1: 11.45 GHz Group 1: -69.3	
C.10	Type and identity of the associated station(s). (This may be another space station, a typical earth station of the network or a specific earth station.)	Typical earth station Identity: TYPICAL-11M	
C.10.c.2	Maximum isotropic gain (dBi)	60.2 dBi	
C.10.c.3	Half-power beamwidth (deg)	0.14	
C.10.c.4	Reference radiation pattern	27 – 25LOG(FI)	Verify w/ Vertex
C.10.c.5	Lowest total receiving system noise temperature, referred to the output of the receiving antenna of the earth station under clear-sky conditions, when the associated station is a receiving earth station.	Group 1: 435° K	

(RETURN LINK) (space-to-Earth)

C.11.b	Service area identified by a maximum of 20 test points and a service area contour or by a minimum elevation angle for transmitting space stations. Service area identified by a maximum of 20 test points and a service area contour or by a minimum elevation angle for receiving space stations.	(33.28, -111.94) (38.49, -77.11); Service area is shown within the -3 dB contour in Figure Y. Not applicable	Points given as (°N, °E)
C.12	Minimum required protection ratio, if less than 26 dB	Not applicable	

Appendix E. ITU Advance Publication Information (S-Band) and Cost Recovery

In accordance with Section I of Article 9, ITU Radio Regulations, Iridium herein provides Advance Publication Information (API) for the S-band portion of its 2 GHz GSO MSS network. Appendix E provides the print version of the API that was generated by ITU Space Capture software. An electronic version of the Microsoft Access database file has been emailed to Sankar Persaud.



IFIC / DATE IFIC / DATE IFIC / FECHA	SECTION SPECIALE N.º SPECIAL SECTION No. SECCIÓN ESPECIAL N.º
RESEAU(X) A SATELLITE SATELLITE NETWORK(S) RED(ES) DE SATELITE	ADMINISTRATION RESPONSABLE RESPONSIBLE ADMINISTRATION ADMINISTRACIÓN RESPONSABLE

USASATXX

USA

RENSEIGNEMENTS REÇUS PAR LE BUREAU LE
INFORMATION RECEIVED BY THE BUREAU ON
INFORMACIÓN RECIBIDA POR LA OFICINA EL

06.06.2003

Ces renseignements sont publiés par le Bureau des radiocommunications en application du No. 9.2B. Ils font l'objet de la (les) procédure(s) suivante(s), indiquée(s) ci-dessous par un X dans la case pertinente.

This information is published by the Radiocommunication Bureau in accordance with No. 9.2B. It is subject to the procedure(s) indicated below by an X in the relevant box.

Esta información se publica por la Oficina de Radiocomunicaciones en virtud del No. 9.2B. Está sujeta al (a los) procedimiento(s) siguiente(s), señalado(s) con una X en la casilla apropiada.

<input type="checkbox"/> Les renseignements ont été reçus conformément à l'Article 9, sous-section IA	The information has been received pursuant to Article 9, Sub-Section IA	La información ha sido recibida de conformidad con el artículo 9, sub-sección IA
<input type="checkbox"/> Toute administration estimant que des brouillages inacceptables peuvent être causés à ses réseaux ou à ses systèmes à satellites existants ou en projet devra communiquer ses commentaires à l'administration qui a demandé la publication, avec copie au Bureau des radiocommunications, dans le délai de quatre mois qui suit la date de la présente publication.	Any administration which believes that unacceptable interference may be caused to its existing or planned satellite networks or systems shall communicate its comments to the publishing administration, with a copy to the Radiocommunication Bureau, within four months after the date of this publication.	Toda administración que estime que pueden causarse interferencias inaceptables a sus redes o sistemas de satélites existentes o previstos comunicará sus comentarios a la administración que haya publicado la información, con copia a la Oficina de Radiocomunicaciones, en un plazo de cuatro meses contados a partir de la fecha de esta publicación.
DATE LIMITE POUR LA RECEPTION DES COMMENTAIRES EXPIRY DATE FOR THE RECEIPT OF COMMENTS FECHA LÍMITE PARA LA RECEPCIÓN DE LOS COMENTARIOS		
<input checked="" type="checkbox"/> Les renseignements ont été reçus conformément à l'Article 9, sous-section IB	The information has been received pursuant to Article 9, Sub-Section IB	La información ha sido recibida de conformidad con el artículo 9, sub-sección IB
<input checked="" type="checkbox"/> Toute administration estimant que ses réseaux à satellite, ses systèmes à satellites ou ses stations de terre, selon le cas, existants ou en projet, sont affectés, peut envoyer ses observations à l'administration qui a demandé la publication des renseignements, avec copie au Bureau des radiocommunications.	Any administration which considers that its existing or planned satellite systems or networks or terrestrial stations, as appropriate, are affected, may send its comments to the administration which has requested publication of the information, with a copy of such comments to the Radiocommunication Bureau.	Cualquier administración que considere que sus sistemas o redes de satélites o estaciones terrenales, según el caso, existentes o planificados se verán afectados, podrá comunicar sus comentarios a la administración que haya solicitado la publicación de la información, enviando una copia de dichos comentarios a la Oficina de Radiocomunicaciones.

Items	Description	Description	Description
A1a	Identité du réseau à satellite	Identity of the satellite network	Identidad de la red de satélite
A1f1	Administration notificatrice (voir le Tableau 1 de la Préface)	Notifying administration (Refer to Table 1 of the Preface)	Administración notificante (véase el cuadro 1 del Prefacio)
A1f2	Organisation Intergouvernementale de Satellite	Intergovernmental Satellite Organization	Organización Intergubernamental de Satélite
A2a	Date de mise en service	Date of bringing into use	Fecha de puesta en servicio
A2b	Période de validité (année)	Period of validity (year)	Periodo de validez (año)
A4a1	Longitude nominale d'une station spatiale géostationnaire (degré)	Nominal longitude of a geostationary space station (degree)	Longitud nominal de una estación espacial geostacionaria (grado)
A4b1	Inclinaison de l'orbite (degré)	Angle of inclination of the orbit (degree)	Angulo de inclinación de la órbita (grado)
A4b2	Période (j/j/hh/mm)	Period (ddd/hh/mm)	Periodo (ddd/hh/mm)
A4b3a	Altitude de l'apogée (km)	Altitude of the apogee (km)	Altitud del apogeo (km)
A4b3b	Altitude du périgée (km)	Altitude of the perigee (km)	Altitud del perigeo (km)
A4b4a	Nombre de satellites	Number of satellites	Número de satélites
A4b4b	Corps de référence	Reference body	Cuerpo de referencia
A4b5a	Nombre de plans orbitaux	Number of orbital planes	Número de planos orbitales
A13	Référence aux Sections Spéciales	Reference to Special Sections	Referencia a las Secciones Especiales
C1	Gamme de fréquences	Frequency Range	Gama de frecuencias
C4a	Classe de station (voir le Tableau 3 de la Préface)	Class of station (Refer to Table 3 of the Preface)	Clase de estación (véase el cuadro 3 del Prefacio)
C4b	Nature du service (voir le Tableau 4 de la Préface)	Nature of service (Refer to Table 4 of the Preface)	Naturaleza del servicio (véase el cuadro 4 del Prefacio)
C11a4	Description détaillée de la zone de service	Narrative description of the service area	Descripción detallada de la zona de servicio
BR1	Date de réception	Date of receipt	Fecha de recepción
BR3a	Code de référence de la disposition	Provision reference code	Código de referencia de la disposición
BR6a	Numéro d'identification du réseau à satellite	Identification number of the network	Número de identificación de la red
BR6b	Ancien numéro d'identification du réseau à satellite	Old identification number of the network	Número anterior de la identificación de la red
BR7a	Numéro d'identification du groupe	Identification number of the group	Número de la identificación del grupo
BR7b	Ancien numéro d'identification du groupe	Old identification number of the group	Número anterior de la identificación del grupo
BR9	Code indiquant l'action effectuée sur l'entité (groupe)	Code indicating the action to be taken on the entity (group)	Código que indica la acción efectuada en la entidad (grupo)
BR14	Symbole et numéro de la Section Spéciale	Symbol and number of the Special Section	Símbolo y número de la Sección Especial
BR20	Numéro de la IFIC	IFIC number	Número de la IFIC
BR22	Remarques de l'Administration	Administration remarks	Observaciones de la Administración
BR23	Observations du Bureau des radiocommunications	Radiocommunication Bureau comments	Comentarios de la Oficina de Radiocomunicaciones

SECTION ESPECIAL / SPECIAL SECTION / SECCION ESPECIAL

A A1a Sat. Network A1f1 Notifying adm. A1f2 Inter. sat. org. BR20 IFIC no.

BR6a/BR6b id. no. BR3a Provision reference BR1 Date of receipt

A4a1 Orbital long.

BR7a/BR7b Group id. BR14 Special Section

A2a Date of bringing into use A2b Period of valid.

C1 Frequency Range: From MHz To MHz

C4a Class of station

C4b Nature of service

C11a4 Service area

BR7a/BR7b Group id. BR14 Special Section

A2a Date of bringing into use A2b Period of valid.

C1 Frequency Range: From MHz To MHz

C4a Class of station

C4b Nature of service

C11a4 Service area

BR22 Administration remarks

BR23 Radiocommunication Bureau comments

1600 Wilson Boulevard
Suite 1000
Arlington, VA 22209
USA

T: 703 465 1000
F: 703 465 1038

IRIDIUM 2GHZ LLC

June 6, 2003

Robert Nelson
Chief, Engineering Branch
Satellite Division
International Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

Re: ITU Advance Publication Information

Dear Mr. Nelson:

This letter is in reference to the International Telecommunication Union ("ITU") Advance Publication Information that Iridium 2GHz LLC ("Iridium") submitted to the Commission on this date as an attachment to its Application for Modification of its license to operate a 2 GHz MSS network.¹

As a result of actions taken at the ITU 1998 Plenipotentiary Conference, processing fees are now being charged by the ITU for satellite network filings the API for which is received by the ITU after 7 November 1998.² Iridium confirms herein that it is aware that Iridium is responsible for any and all ITU fees associated with its June 6, 2003 advance publication filing. Iridium unconditionally accepts this requirement and Iridium's responsibility to pay any ITU cost recovery fees associated with Iridium's ITU filing at the appropriate time.

Thank you for your assistance in this matter. If you have any questions, please contact Michael Deutschman, Chief Administrative Officer/Chief Counsel, Iridium 2GHz LLC, at 703.465.1000.

Yours sincerely,


Michael Deutschman

¹ *Application of Iridium LLC; Concerning Use of the 1990-2025/2165-2200 MHz and Associated Frequency Bands for a Mobile-Satellite System, Order & Authorization, 16 FCC Rcd 13778 (Int'l Bur. 2001) ("Iridium Order").*

See Resolution COM5/21 (1998 ITU Plenipotentiary Conference).

EXHIBIT 1

Alien Ownership Statement

Iridium 2GHz LLC (“Iridium”) holds a license to provide mobile satellite service (“MSS”) in the 1990-2025 MHz and 2165-2200 MHz frequencies.¹ Because Iridium is authorized to provide MSS on a non-common carrier basis, the foreign ownership provisions of Section 310(b) of the Communications Act of 1934, as amended,² are not applicable.

¹ *Application of Iridium LLC; Concerning Use of the 1990-2025/2165-2200 MHz and Associated Frequency Bands for a Mobile-Satellite System, Order & Authorization, 16 FCC Rcd 13778 (Int’l Bur. 2001) (“Iridium Order”).*

² 47 U.S.C. § 310(b).

EXHIBIT 2

Waiver Request

A full discussion of the waivers sought by Iridium in this matter can be found in Section III.25.114(c)(8) of the attached Application.

Exhibit 3

**IBFS Website Filing Confirmation for Iridium 2GHz LLC'
Application for Modification
(printed July 16, 2003)**


Federal Communications Commission

INTERNATIONAL BUREAU
FCC SELECTED APPLICATION LISTING BY FILE NUMBER
REPORT WR07 - Wed Jul 16 16:48:38 US/Eastern 2003

File Number = SATMOD2003060900103;

<p>File Number: SAT-MOD-20030609-00103</p> <p>Callsign: S2325</p> <p>Streamlined: N/A</p> <p>Environmental Impact: N</p> <p>Status: System Entry</p> <p>Status Date: 06/13/2003</p> <p>Last Action: None</p> <p>Grant Date: None</p> <p>Nature of Service: Mobile Satellite Service</p>	<p>Accepted For Filing PN Date: None</p> <p>Action Taken PN Date: None</p> <p>Term Begin Date: None</p> <p>Term End Date: None</p> <p>Date Filed: 06/06/2003</p> <p>Date Last Updated: 06/13/2003</p> <p>Last Action Date: None</p>
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Document Viewing

[Other filings related to this application](#)
(Petitions, comments, etc)

[Attachment Menu](#)

[PDF Version of this application.](#) [HTML version of this application.](#)

Old File Number: None

<p>Applicant:</p> <p>Iridium 2GHz LLC 1600 Wilson Blvd. Suite 1000 Arlington, VA 22209 USA</p>	<p>Contact: None</p> <p>WILEY REIN & FIELDING LLP 1776 K STREET, NW WASHINGTON, DC 20006 USA</p>
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Description: Iridium requests authority to modify the authorization provided by the Commission in Iridium's 2 GHz MSS license in order to launch and operate a single GSO MSS satellite system, rather than the NGSO MSS constellation provided for in Iridium's July 17, 20

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2003