

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

In the Matter of)	
)	
Iridium Constellation LLC)	File No. SAT-MOD-2012_____
)	
Application for Modification of)	
Authorization (Call Sign S2110))	

**APPLICATION OF IRIDIUM CONSTELLATION LLC
FOR MODIFICATION OF AUTHORIZATION**

Iridium Constellation LLC (“Iridium”), pursuant to Section 25.117 of the rules of the Federal Communications Commission (the “Commission” or “FCC”),¹ hereby seeks to modify its authorization for its “Big LEO” band non-geostationary satellite orbit (“NGSO”) constellation (call sign S2110).² Specifically, this modification application seeks authority periodically to co-locate and operate additional satellites in Iridium’s mission constellation. Each co-located pair of satellites will operate as the functional equivalent of one satellite.

In accordance with the Commission’s rules, this application has been filed electronically as an attachment to FCC Form 312.³ In Exhibit A, Iridium provides an Engineering Statement containing representative technical information relating to the proposed operation of co-located satellites. In Exhibit C, Iridium identifies the information requested on FCC Form Schedule S that will change as a result of the

¹ 47 C.F.R. § 25.117.

² See *Motorola Satellite Communications, Inc. for Authority to Construct, Launch, and Operate a Low Earth Satellite System in the 1616-1626.5 MHz Band*, 10 FCC Rcd 2268 (1995) (“*Motorola Order*”).

³ 47 C.F.R § 25.117(c).

proposed modification. To the extent necessary, Iridium requests waiver of the requirement to provide electronically a completed FCC Form Schedule S. The remainder of the technical information previously provided to the FCC is not changing and is incorporated by reference.⁴

I. DESCRIPTION OF THE AUTHORITY REQUESTED

On January 1, 1995, the FCC authorized Iridium's predecessor in interest to launch and operate a NGSO mission constellation of 66 satellites in the Big LEO band.⁵ Until recently, Iridium operated its 66-satellite mission constellation in six orbital planes of eleven slots each in nearly circular polar orbits. Last month, Iridium commenced operating a pair of co-located satellites in plane 4, slot 7 of its NGSO constellation pursuant to a grant of special temporary authority.⁶

This application seeks permanent authority for Iridium periodically to add satellites to its orbital constellation. The additional satellites would be co-located and operated in tandem with existing satellites. As part of each co-location, Iridium would place a satellite approximately 100 km from a satellite operating in one of its 66 occupied

⁴ See Motorola Satellite Communications, Inc., Minor Amendment to Application of Motorola Satellite Communications, Inc. for Authority to Construct, Launch and Operate a Low Earth Orbit Satellite System in the 1616-1626.5 MHz Band, File No. SAT-AMD-19941115-00069 (filed Nov. 15, 1994) ("Motorola 1994 Amendment"); Motorola Satellite Communications, Inc., Application for Minor License Modifications and Technical Waivers, File No. SAT-MOD-19960322-00047 (filed Mar. 8, 1996) ("Motorola 1996 Application"); Iridium Constellation LLC, Application for Minor Modification of Mobile Satellite Service Authorization to Update Orbital Debris Mitigation Requirements, File No. SAT-MOD-20080701-00140 (filed Jul. 1, 2008).

⁵ See *Motorola Order*.

⁶ On July 18, 2012, the International Bureau granted Iridium special temporary authority ("STA") for 30 days to increase its total number of operating space stations by co-locating two satellites. See File No. SAT-STA-20120716-00116. On July 19, 2012, Iridium brought in-orbit spare satellite SV051 into operation and filed a notice with the FCC. See Letter from Donna Bethea-Murphy, Iridium Constellation LLC, to Marlene H. Dortch, Federal Communications Commission (filed July 26, 2012).

orbital boxes. Iridium would then configure the co-located pair to operate as one satellite providing appropriate L-Band coverage and K-band connectivity to our ground locations. As a result, even though additional satellites would be operating as part of Iridium's mission constellation, it essentially would continue to function as a 66-satellite mission constellation.

The authority requested by this modification application is illustrated by Iridium's current operation of co-located satellites in plane 4, slot 7. That orbital position was previously occupied solely by SV007, a satellite that experienced a partial technical anomaly in 2009.⁷ SV051, a former spare satellite, has now replaced SV007 near the center of the orbital box for slot 7 in plane 4, and SV007 has been re-located approximately 100 kilometers behind. This co-location has resulted in operation of 67 satellites, with twelve instead of eleven satellites operating in plane 4.⁸

To keep the Commission apprised of changes to its constellation following grant of this modification application, Iridium proposes to file a letter within 10 days of co-locating satellites that specifies (1) the plane and slot position, (2) the date of co-location and (3) the total number of operating satellites in Iridium's mission constellation.

II. GRANT OF THE MODIFICATION WILL SERVE THE PUBLIC INTEREST

Grant of this modification application will serve the public interest. In evaluating space station modifications, "the Commission has determined that spacecraft design decisions should be left to each space station licensee, because the licensee is in a better

⁷ See Iridium Communications Inc. 2009 Annual Report and Request for Confidential Treatment (filed Oct. 15, 2009).

⁸ See Engineering Statement, Exhibit A.

position to determine how to tailor its system to meet the particular needs of its customer base.”⁹ This “flexible” policy “allow[s] satellite operators to respond to changing technological . . . conditions.”¹⁰ Accordingly, “[i]f a [modification] proposal will not cause interference to other licensed operations, the Commission generally authorizes it if it is otherwise in the public interest.”¹¹

Grant will serve the public interest by enabling Iridium to implement a more flexible configuration of its satellite constellation to provide more L-band connectivity and improved global service to its users. As noted in Iridium’s STA application, the Iridium constellation design provides significant coverage overlap for mitigation of service gaps from individual satellite outages.¹² With most system processing performed using software onboard each satellite instead of on the ground, engineers can develop additional functionality and software-based solutions to occasional faults and anomalies in the system.¹³ The result will be improved service quality for customers. In turn, such robust system flexibility may also facilitate the seamless transition to Iridium’s planned NEXT constellation.

Moreover, as demonstrated by the existing co-location of SV007 and SV051, grant of this modification request poses no interference risk. The future satellite co-locations proposed by this modification application will replicate the station-keeping

⁹ *DigitalGlobe, Inc.*, Order and Authorization, 20 FCC Rcd 15696, ¶ 9 (I.B. 2005).

¹⁰ *Id.*

¹¹ *Id.*

¹² *See Iridium Communications Inc.*, United States Securities and Exchange Commission Form 10-K for year ending Dec. 31, 2011, at 14.

¹³ *Id.*, at 15.

model of SV007 and SV051. Specifically, Iridium will locate additional satellites approximately 100 km from the center of Iridium's 66 orbital positions to ensure safe station-keeping of both satellites without any overlap in orbital position.¹⁴ In addition, Big LEO band communications will be provided only on the satellites located in each of Iridium's 66 orbital boxes as currently authorized by the Commission. Further, Iridium's software developments and hardware capabilities enable operation of co-located satellites without harmful interference by connecting each co-located satellite into the constellation using complementary, non-repetitive crosslinks. For example, with the SV007 and SV051 co-location, Iridium will connect SV051 into the constellation using its in-plane Fore crosslink and connect SV007 into the constellation with its East and West crosslinks.

III. REQUEST FOR WAIVER

To the extent necessary, Iridium requests a waiver of the Section 25.117(c) requirement to provide FCC Form Schedule S.¹⁵ The Commission may waive its rules for good cause shown.¹⁶ The FCC typically exercises its discretion to waive a rule when the particular facts make strict compliance inconsistent with the public interest.¹⁷ In

¹⁴ The Iridium satellites operate with 6.0 km station-keeping. *See* Motorola 1994 Amendment, Table R-1 (Rev 1) – (Page 3 of 3).

¹⁵ 47 C.F.R. § 25.117(c). Iridium will, however, prepare and file a Schedule S in the event the Commission determines that such a submission is necessary.

¹⁶ 47 C.F.R. § 1.3.

¹⁷ The Commission has considerable discretion as to whether to waive its rules. *See Office of Communication of United Church of Christ v. FCC*, 911 F.2d 803, 812 (D.C. Cir. 1990) (upholding the Commission's grant of a waiver "[g]iven the deference due the agency in matters of this sort"); *City of Angels Broadcasting, Inc. v. FCC*, 745 F.2d 656, 663 (D.C. Cir. 1984) (noting that the scope of review of a waiver determination by the Commission "is narrow and constrained").

addition, the agency may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis.¹⁸

Good cause exists to waive the requirement for Iridium to submit a FCC Form Schedule S with this modification application. Only the information requested in fields S.4.a (Total Number of Satellites in Network or System), S.4.f (No. of Satellites in Plane), and S.5 (Initial Satellite Phase Angle) will change when Iridium co-locates satellites. To demonstrate, Iridium is providing the changed information for Questions S.4 and S.5 as applied to the co-location of SV051 and SV007 in narrative form in Exhibit C. The remainder of the technical information requested by FCC Form Schedule S is not affected by the proposed co-location of additional satellites. Under such circumstances, the burden associated with completing an electronic FCC Form Schedule S outweighs any benefit. For these reasons, good cause exists, to the extent necessary, to grant a waiver of the requirement to provide FCC Form Schedule S.

¹⁸ *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

IV. CONCLUSION

For the reasons set forth above, Iridium respectfully requests that the Commission grant this modification application.

Respectfully submitted,

By: Donna Bethea-Murphy

Donna Bethea-Murphy
Vice President, Regulatory
Engineering
Iridium Satellite LLC
1750 Tysons Boulevard
Suite 1400
McLean, VA 22102

August 13, 2012

Engineering Statement

The co-location of SV051 and SV007 within the same slot will not result in the utilization of any additional frequencies beyond what is already authorized for Iridium's constellation. The links of the co-located satellites will possess the same RF power and waveform characteristics as other links in the constellation (subject to normal variation characteristics due to hardware). Iridium will configure SV051 and SV007 so that their combined capabilities produce the near equivalent communications capability of a single operational satellite.

The following describes the proposed configuration of each co-located satellite in the SV051/SV007 configuration:

SV051 Configuration

- **Crosslink:** SV051 utilizes only the in-plane Fore crosslink. The Fore crosslink currently utilizes the nominal Fore/Aft frequency. This channel possesses a center frequency of 23.2675 GHz with a 25 MHz bandwidth. The Fore link can be configured to use any of the authorized Iridium Crosslink channels.
- **Feederlink:** Link antennas are failed in fixed position and utilized for orbit determination and commanding and telemetry at TTAC sites. Links are not used for Gateway contacts. The links can utilize any of the Iridium channels permitted by site regulatory agreements.
- **Secondary link:** No difference from other operational Iridium satellites. The secondary link utilizes the fixed Iridium Secondary Link Frequencies. The Uplink Center Frequency is 29.2298 GHz, and the Downlink is 19.5073 GHz.
- **L-Band:** SV051 utilizes only authorized sub-bands authorized for the Iridium constellation. The footprint is that of other operational Iridium satellites shifted by 50 km in front of the center of the orbital box.

SV007 Configuration

- **Crosslink:** SV007 utilizes both of its East/West crosslinks. The Fore crosslink has been powered down so that SV051 can establish a crosslink with SV006. The Aft link is shut down due to its sister link having failed (SV008). SV007 currently utilizes the standard East/West frequencies. This channel possesses a center frequency of 23.2925 GHz with a 25 MHz bandwidth. The East/West links can be configured to use any of the authorized Iridium Crosslink channels.
- **Feederlink:** No difference from other operational Iridium satellites. Links are used in support of both Gateway and TTAC contacts. The links can utilize any of the Iridium channels permitted by site regulatory agreements.
- **Secondary link:** No difference from other operational Iridium satellites. The secondary link utilizes the fixed Iridium Secondary link frequencies. The Uplink Center Frequency is 29.2298 GHz, and the Downlink is 19.5073 GHz.
- **L-Band:** The L-Band for SV007 is turned off.

Certification of Iridium Constellation LLC

I hereby certify that I am a technically qualified person and am familiar with Part 25 of the Commission's Rules and Regulations. The contents of the engineering statement were prepared by me or under my direct supervision and to the best of my knowledge are complete and accurate.

/s/

Walter Everetts
Executive Director, Satellite Operations and SCS Development
Iridium

Schedule S, Questions S4. and S5.

Exhibit C

FEDERAL COMMUNICATIONS COMMISSION
 SATELLITE SPACE STATION AUTHORIZATIONS
 FCC Form 312 - Schedule S: (Technical and Operational Description)

S4. ORBITAL INFORMATION FOR NON-GEOSTATIONARY SATELLITES ONLY

S4a. Total Number of Satellites in Network or System: 67

S4c. Celestial Reference Body (Earth, Sun, Moon, etc.): Earth

S4a. Total Number of Orbital Planes in Network or System: 6

S4d. Orbit Epoch Date: July 30, 2012

For each Orbital Plane Provide:

(e) Orbital Plane No.	(f) No. of Satellites in Plane	(g) Inclination Angle (degrees)	(h) Orbital Period (Seconds)	(i) Apogee (km)	(j) Perigee (km)	(k) Right Ascension of the	(l) Argument of Perigee (Degrees)	Active Service Arc Range		
								(m) Begin Angle	(n) End Angle	(o) Other
1	11	86.4	6028	789	771	249.2	90			0 to 360*
2	11	86.4	6028	789	771	280.8	90			0 to 360*
3	11	86.4	6028	789	771	312.4	90			0 to 360*
4	12	86.4	6028	789	771	343.9	90			0 to 360*
5	11	86.4	6028	789	771	15.6	90			0 to 360*
6	11	86.4	6028	789	771	47.2	90			0 to 360*

* All the satellites have been designed for full coverage of earth (360 degrees of arc). When over the higher latitudes, some of the satellites are programmed to turn off their L-band beams due to overlapping coverage to avoid frequency interference.

S5. INITIAL SATELLITE PHASE ANGLE For each satellite in each orbital plane, provide the initial phase angle

(a) Orbital Plane No.	(b) Satellite Number	(c) Initial Phase Angle (Degrees)
4	19	169.9
4	34	137.2
4	35	104.5
4	97	71.8
4	5	39
4	6	6.3
4	51	334
4	7	333.2
4	8	300.9
4	4	268.1
4	37	235.7
4	61	202.7

Note: 51 and 7 have 0.2 degrees separation in phase

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FCC Form 312, Response to Question 34: Foreign Ownership

Iridium Constellation LLC holds a non-common carrier “Big LEO” NGSO space station constellation license. Accordingly, this modification application is not subject to the foreign ownership limitations set forth in Section 310(b) of the Communications Act.

The Commission has approved the foreign ownership of Iridium Holdings LLC (the indirect parent company of both Iridium Constellation LLC and Iridium Carrier Services LLC, which holds a common carrier earth station license) in excess of twenty-five percent and has provided Iridium Carrier Services LLC flexibility to acquire additional foreign ownership subject to certain conditions. *See Applications of Space Station System Licensee, Inc., Assignor, and Iridium Constellation LLC, Assignee, for Consent to Assignment of License Pursuant to Section 310(d) of the Communications Act, Memorandum Opinion, Order and Authorization, DA 02-307, 17 FCC Rcd 2271 (Int'l Bur. 2002) (“2002 Iridium Order”); Iridium Holdings LLC and Iridium Carrier Holdings LLC, Transferors, and GHL Acquisition Corp., Transferee, Applications for Consent to Transfer Control of Iridium Carrier Services LLC, Iridium Satellite LLC, and Iridium Constellation LLC, Memorandum Opinion and Order, IB Docket No. 08-232, DA 09-1809 (rel. Aug. 14, 2009) (“Iridium-GHL Order”).* Since the *Iridium-GHL Order*, any changes to the foreign ownership of Iridium Holdings LLC have been consistent with Iridium Communications Inc.’s status as a publicly traded company and the *2002 Iridium Order* and *Iridium-GHL Order*.¹⁹

¹⁹ This assessment with respect to the foreign ownership of Greenhill and the public shareholders relies on the detailed analyses conducted by the Altman Group in connection with the *Iridium-GHL Order*. *See Iridium-GHL Order* ¶¶ 41-43 (analyses of foreign ownership attributable to participation of GHQ IPO shareholders and Greenhill).

**FCC Form 312, Response to Question 40:
Officers and Directors of Iridium Constellation LLC**

The name, principal business, address, citizenship, and ownership interest of each individual or entity that will directly or indirectly control a ten percent or greater interest in Iridium Constellation LLC is as follows:

Name:	Iridium Satellite LLC
Principal Business:	Holding company and global provider of mobile satellite products and services
Address:	1750 Tysons Boulevard Suite 1400 McLean, Virginia 22102
Citizenship:	U.S.
Voting Interest:	100% (of Iridium Constellation LLC)
Equity Interest:	100% (of Iridium Constellation LLC)

Name:	Iridium Holdings LLC
Principal Business:	Holding Company
Address:	1750 Tysons Boulevard Suite 1400 McLean, Virginia 22102
Citizenship:	U.S.
Voting Interest:	100% (of Iridium Satellite LLC)
Equity Interest:	100% (of Iridium Satellite LLC)

Name:	Syncom-Iridium Holdings Corporation
Principal Business:	Holding Company
Address:	1750 Tysons Boulevard Suite 1400 McLean, Virginia 22102
Citizenship:	U.S.
Voting Interest:	13.7% (of Iridium Holdings LLC)
Equity Interest:	13.7% (of Iridium Holdings LLC)

Name:	Iridium Blocker-B Inc.
Principal Business:	Holding Company
Address:	1750 Tysons Boulevard Suite 1400 McLean, Virginia 22102
Citizenship:	U.S.
Voting Interest:	36.2% (of Iridium Holdings LLC)
Equity Interest:	36.2% (of Iridium Holdings LLC)

Name: Iridium Communications Inc.
Principal Business: Holding Company
Address: 1750 Tysons Boulevard
Suite 1400
McLean, Virginia 22102
Citizenship: U.S.
Voting Interest: 50.1% (of Iridium Holdings LLC)
100% (of Syncom-Iridium Holdings Corp.)
100% (of Iridium Block-B Inc.)
Equity Interest: 50.1% (of Iridium Holdings LLC)
100% (of Syncom-Iridium Holdings Corp.)
100% (of Iridium Block-B Inc.)

Name: Baralonco Limited
Principal Business: Holding Company
Address: Craigmuir Chambers
P.O. Box. 71
Road Town, Tortola, British Virgin Islands
Citizenship: British Virgin Islands
Voting Interest: 16.5% (of Iridium Communications Inc.)
Equity Interest: 16.5% (of Iridium Communications Inc.)

Name: Khalid bin Abdullah bin Abdulrahman
Principal Business: Businessman and Investor
Address: Craigmuir Chambers
P.O. Box. 71
Road Town, Tortola, British Virgin Islands
Citizenship: Saudi Arabia
Voting Interest: 100% (of Baralonco Limited)
Equity Interest: 100% (of Baralonco Limited)

Iridium Constellation LLC is a Delaware limited liability company. Iridium Satellite LLC has been designated as “Manager” of Iridium Constellation LLC. The following individuals have been designated as “officers” via special resolution of the Manager:

Matthew J. Desch, President and Chief Executive Officer
Thomas J. Fitzpatrick, Chief Financial Officer and Treasurer
Thomas D. Hickey, Chief Legal Officer and Secretary