

November 15, 2010

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Ms. Mindel De La Torre
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Federal Communications Commission
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Re: Request for Confidential Treatment – PUBLIC VERSION

Globalstar Licensee LLC
Designation: HIBLEO-4FL (ITU) / S2115 (FCC) and HIBLEO-X (ITU)

Application for Modification of Mobile Satellite Service Earth Station Licenses and Mobile Earth Terminal Licenses to Authorize Communications with Second-Generation System and to Incorporate Previously-Granted Ancillary Terrestrial Component Authority, File No. SAT-AMD-20091221-00147 (as amended)

Dear Ms. De La Torre:

In response to a request from Commission staff, and as part of its above-captioned application, Globalstar Licensee LLC hereby submits the attached letter containing information concerning its satellites' propulsion system and their planned end-of-life ("EOL") orbit ("Nov. 15 Letter").

Globalstar respectfully requests that, pursuant to Sections 0.457 and 0.459 of the Commission's rules, 47 C.F.R. §§ 0.457, 0.459, the Commission withhold from public inspection and accord confidential treatment to portions of the attached submission, which contain commercially sensitive information that falls within Exemption 4 of the Freedom of Information Act ("FOIA").¹ Attached hereto is a redacted version for public inspection.

Exemption 4 permits parties to withhold from public information "trade secrets and commercial or financial information obtained from a person and privileged or confidential categories of materials not routinely available for public inspection."² Applying Exemption 4, the courts have stated that commercial or financial information is confidential if its disclosure will either (1) impair the government's ability to obtain necessary information in the future; or (2) cause substantial harm to the competitive position of the person from whom the information was obtained. *See National Parks and Conservation Ass'n v. Morton*, 498 F.2d 765, 770 (D.C. Cir. 1974)(footnote omitted); *see also Critical Mass Energy Project v. NRC*, 975 F.2d 871, 879-80

¹ *See* 5 U.S.C. § 552(b)(4); 47 C.F.R. § 0.457(d).

² *Id.*

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(D.C. Cir. 1992), *cert. denied*, 507 U.S. 984 (1993). Section 0.457(d)(2) allows persons submitting materials that they wish to be withheld from public inspection in accordance with Section 552(b)(4) to file a request for non-disclosure, pursuant to Section 0.459. In accordance with the requirements contained in Section 0.459(b) for such requests, Globalstar hereby submits the following:

(1) *Identification of Specific Information for Which Confidential Treatment is Sought (Section 0.459(b)(1))*. Globalstar seeks confidential treatment for portions of its Nov. 15 Letter, which contain information concerning its satellites' propulsion system and their planned end-of-life ("EOL") orbit.

(2) *Description of Circumstances Giving Rise to Submission (Section 0.459(b)(2))*. Globalstar is submitting this information in response to inquiries from Commission staff.

(3) *Explanation of the Degree to Which the Information is Commercial or Financial, or Contains a Trade Secret or is Privileged (Section 0.459(b)(3))*. Portions of the Nov. 15 Letter contain sensitive commercial information that Globalstar's competitors could use to Globalstar's disadvantage. The courts have given the terms "commercial" and "financial," as used in Section 552(b)(4), their ordinary meanings. The Commission has broadly defined commercial information, stating that "[c]ommercial" is broader than information regarding basic commercial operations, such as sales and profits; it includes information about work performed for the purpose of conducting a business's commercial operations." Certain information contained in the Nov. 15 Letter falls clearly within the definition of commercial. Competitors could use this information to enhance their market position at Globalstar's expense.

(4) *Explanation of the Degree to Which the Information Concerns a Service that is Subject to Competition (Section 0.459(b)(4))*. Substantial competition exists in the mobile satellite service industry. The presence of competitors makes imperative the confidential treatment of sensitive commercial information. Indeed, for this reason, Globalstar's primary competitor, Iridium Satellite LLC, routinely requests and has obtained confidential treatment of information submitted to the Commission concerning the status of its mobile satellite service constellation. *See, e.g.* Iridium Communications Inc., 1.6/2.4 GHz Mobile Satellite System License, Call Sign S2110, Section 25.143(e) Annual Report and Request for Confidential Treatment Pursuant to Sections 0.457 and 0.459 (filed Oct. 15, 2009).

(5) *Explanation of How Disclosure of the Information Could Result in Substantial Competitive Harm (Section 0.459(b)(5))*. As explained above in Section 3, release of the information contained in the redacted portion of the Nov. 15 Letter could affect Globalstar's commercial operations. If competitors or customers had access to this information, it could negatively affect Globalstar's future negotiations with potential and existing customers.

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(6) *Identification of Measures Taken To Prevent Unauthorized Disclosure (Section 0.459(b)(6))*. Globalstar treats the information contained in the redacted portion of the Nov. 15 Letter as confidential information and has not disclosed it publicly. Globalstar limits access to the information contained in the redacted portion of the Nov. 15 Letter to necessary personnel only. In addition, Globalstar takes precautions to ensure that this information is not released to the general public or obtained by its competitors through other means.

(7) *Identification of Whether the Information is Available to the Public and the Extent of Any Previous Disclosure of Information to Third Parties (Section 0.459(b)(7))*. Globalstar has not made the information in the redacted portion of the Nov. 15 Letter available to the public and has not disclosed the information to any third parties.

(8) *Justification of Period During Which the Submitting Party Asserts that the Material Should Not be Available for Public Disclosure (Section 0.459(b)(8))*. Globalstar respectfully requests that the Commission withhold certain information in the Nov. 15 Letter from public inspection indefinitely. This information will remain commercially sensitive while the Globalstar 2.0 satellite constellation is operational.

Please do not hesitate to contact me with any questions.

Respectfully submitted,

/s/ Samir Jain

Samir Jain
Counsel to Globalstar Licensee LLC

Encl.

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Application for Modification of Mobile Satellite Service Earth Station Licenses and Mobile Earth Terminal Licenses to Authorize Communications with Second-Generation System and to Incorporate Previously-Granted Ancillary Terrestrial Component Authority, File No. SAT-AMD-20091221-00147 (as amended)

Dear Ms. De La Torre:

Globalstar Licensee LLC (“Globalstar”) hereby supplements the record for its above captioned application in response to questions from Commission staff concerning its satellites’ propulsion system and their planned end-of-life (“EOL”) orbit.

I. Propulsion System

The volume and mass of both the pressurant and propellant at launch and end of life are provided below.

Table 1: Mass and Volume of Propellant and Pressurant

REDACTED			

Attached as Exhibit A are illustrations showing the dimensions and the total volume of the fuel tank.

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Globalstar's satellites contain several features designed to minimize, if not eliminate, the risk of an accidental explosion during and after completion of mission operations that could potentially fragment the spacecraft or otherwise disturb its orbit.

-REDACTED-

As Globalstar explained in its October 12 amendment, even in the worst case scenario, the added velocity to the satellite due to a leak of a jet of pressurant would only be approximately 1.15 meters/second – a minimal effect when compared to the satellite's expected speed of over 7000 meters/second. Alternatively, in the case of a tank rupture where the pressurant stream was not aligned along the center axis and center of mass, the satellite would begin to spin at a circular

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rate of approximately 1.15 meters/second, much like a top spinning in place at its de-orbited altitude, while maintaining its orbit and speed.¹

This additional information requested by Commission staff further confirms that any minor deviation from the requirements of Section 25.283(c) does not pose an appreciable risk of an accidental explosion or otherwise undermine the purpose of the rule.

Moreover, modification of Globalstar's second generation satellites would not be possible at this time. -REDACTED-

The Commission has previously found waiver of Section 25.283(c) appropriate under similar conditions.² For these additional reasons, Globalstar requests that the Commission find that it has met the requirements of Section 25.283(c) or provide a limited waiver of that requirement, to the extent necessary.

¹ *Application for Modification of Mobile Satellite Service Earth Station Licenses and Mobile Earth Terminal Licenses to Authorize Communications with Second-Generation System and to Incorporate Previously-Granted Ancillary Terrestrial Component Authority, etc., SES-AMD-20101012-01278, Narrative at 3 (filed Oct. 12, 2010) (“Globalstar Oct. 12, 2010 Amendment”).*

² *See* Stamp Grant, LightSquared Subsidiary LLC, IBFS File Nos. SAT-MOD-20100405-0064, SAT-AMD-20100908-00191 (granted Nov. 8, 2010) (granting waiver because “undue hardship would result from requiring modification of the space station prior to launch” to comply with Section 25.283(c)). *See also* Stamp Grant, File No. SAT-LOA-20090807-00085 (granted December 15, 2009) (granting waiver of venting requirement for DIRECTV 12/RB2-A, a Boeing 702 satellite, given its imminent launch); Stamp Grant, File No. SAT-LOA-20071221-00183 (granted March 12, 2008) (granting a waiver of venting requirement for AMC-14, a Lockheed A2100 satellite, in light of late stage of satellite construction); Stamp Grant, File Nos. SAT-MOD-20070628-00090, SAT-AMD-20070731-00108 (granted November 30, 2007) (granting waiver of venting requirement for Horizons 2, an Orbital Sciences Star satellite, in light of late stage of satellite construction); Stamp Grant, File Nos. SAT-MOD-20070207-00027, SAT-AMD-20070716-00102 (granted October 4, 2007) (granting waiver of venting requirement for INTELSAT-11, an Orbital Sciences Star-2 satellite, in light of late stage of satellite construction).

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II. Disposal Orbit

As detailed in its previous filings, Globalstar's satellites are designed to de-orbit in a manner that minimizes post-mission collision risk.³ In January 2005, the Commission approved the post-mission disposal plan for Globalstar's first-generation satellites after extensive discussions with NASA and Commission staff.⁴ As of September 30, 2010, Globalstar has de-orbited of its first-generation satellites between km and km and has experienced no collisions or events involving orbital debris. The EOL orbit for Globalstar's second-generation satellites will be at a minimum of 1535 +/- 2 km, and exceed that altitude to the extent possible based on the amount of fuel remaining on any given spacecraft and the capability of the attitude control subsystem. -REDACTED-

This plan conforms with the Commission-approved plan for the first-generation satellites.

The planned disposal orbits are stable. The nominal Globalstar EOL orbits are stable because they are well above the atmosphere, the satellites are relatively light and small, and the orbits are circular. By far the major perturbation is due to the Earth's geopotential with the most obvious effect being nodal regression. The perturbations due to the gravitational attraction of the sun and moon and of solar radiation pressure are quite small. As direct evidence of orbit stability, Globalstar has not observed any deviation in the orbits for any of its de-orbited satellites.

Exhibit B shows the results of cases run on STK using a 12X12 Geopotential Model, that accounts for sun and moon gravitational effects, and solar radiation pressure for a period of 25 years. The two cases considered were for altitudes of 1535 km and 2000 km, and for an

³ See *Application for Modification of Mobile Satellite Service Earth Station Licenses and Mobile Earth Terminal Licenses to Authorize Communications with Second-Generation System and to Incorporate Previously-Granted Ancillary Terrestrial Component Authority*, File No. SAT-AMD-20091221-00147, Narrative at 17-20 (filed Dec. 21, 2009) ("Globalstar Dec. 21, 2009 Application"); Globalstar Oct. 12, 2010 Amendment, Narrative at 4-8.

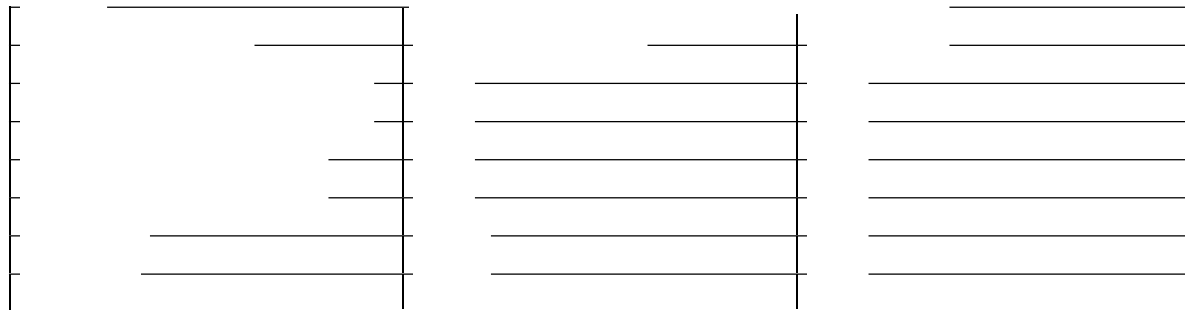
⁴ See Stamp Grant, File Nos. SAT-MOD-20030606-00098 and SAT-AMD-20050105-00003 (granted on Jan. 28, 2005) (approving disposal orbit at 1514 +/- 2 km) ("2005 Grant").

⁵ -REDACTED-

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eccentricity starting at zero. For each case, the model calculated the evolution of the semi-major axis, eccentricity, and inclination. The results are presented in a three-graph set per case in the Exhibit. These results confirm that orbits between the altitudes of 1535 and 2000 km – the planned altitudes for the EOL Globalstar orbits – will be stable over the long term.

-REDACTED-



The probability of collision is not meaningfully different at 1535 and 2000 km. Exhibit C illustrates the results of running the NASA Debris Model using the most recent available data to estimate the debris field at 1535 and 2000 km in the year 2025. This illustration demonstrates that the cumulative cross-section of debris objects of different sizes does not materially change between 1500 and 2000 km and that the likelihood of collision for objects of various sizes between those altitudes is therefore comparable.

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Both precedent and equity support Globalstar's planned disposal orbit. Rather than establish a bright-line altitude requirement for NGSO satellite disposal, the Commission's 2004 *Orbital Debris Order* stated that it would "address cases involving NGSO disposal as they arise" on a "case-by-case" basis.⁶ While noting that U.S. Government Standard Practices suggest a storage orbit for LEO satellites above a 2000 km perigee altitude,⁷ the Commission declined to adopt that suggestion as a rule. Indeed, with regard to the "boost" method of de-orbiting satellites, like that employed by Globalstar, the Commission specifically stated that examination of the disposal altitude would consist of "determin[ing] whether the disposal orbits chosen would be sufficiently stable to remain out of LEO and GEO, and to avoid physical interference with highly utilized MEO orbits."⁸ The information provided by Globalstar in this proceeding confirms that it has met this standard.

The Commission's flexible, case-by-case approach to NGSO satellite disposal was confirmed in the International Bureau's October 13, 2005 Public Notice announcing the effective date of new orbital debris mitigation disclosure rules.⁹ The *Orbital Debris PN* clarified the four elements that must be addressed in a narrative about the orbital debris mitigation plan – "(1) spacecraft hardware design; (2) minimizing accidental explosions; (3) safe flight profiles; and (4) post-mission disposal."¹⁰ Regarding post-mission disposal of NGSO space stations using disposal orbits, the Commission required the disclosure of (1) the "altitudes and orbital parameters of such disposal orbits"; and (2) the amount of fuel (in kg) "intended to be reserved to accomplish post-mission disposal, as well as the methodology used to derive that quantity, including the methods used to determine and address fuel gauging uncertainty."¹¹ The *Orbital Debris PN* did not mention any requirement or recommendation for a 2000 km disposal orbit for NGSO satellites. Globalstar has provided all of the information required by the *Orbital Debris PN* through previous filings and this supplement.

⁶ Second Report and Order, *Mitigation of Orbital Debris*, 19 FCC Rcd 11567, 11601-02 ¶¶ 84, 86 (2004) ("*Orbital Debris Order*").

⁷ *Id.* at 11592 ¶ 62.

⁸ *Id.* at 11602 ¶ 84 n.215.

⁹ Public Notice, *International Bureau Satellite Division Information, Disclosure of Orbital Debris Mitigation Plans, Including Amendment of Pending Applications*, Report No. SPB-112, 20 FCC Rcd 16278 (IB, Sat. Div., Oct. 13, 2005) ("*Orbital Debris PN*").

¹⁰ *Id.* at 16279.

¹¹ *Id.* at 16282.

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Consistent with the *Orbital Debris Order* and the *Orbital Debris PN*, Section 25.114(d)(14) of the Commission’s rules calls for “[a] description of the design and operational strategies that will be used to mitigate orbital debris”¹² but does not include any specific, minimum altitude requirement for NGSO satellite disposal. This absence of a bright-line altitude requirement for NGSO systems contrasts starkly with the Commission’s approach for GSO satellite disposal, for which the Commission *did* adopt more rigid requirements (including an explicit disposal altitude formula and transitional grandfathering of certain GSO satellites that were already launched).¹³

Nor do NASA’s standards establish a minimum altitude requirement for commercial NGSO satellite disposal. While NASA standards contemplate LEO disposal orbits above 2000 km, they also state that they are applicable to “NASA programs and projects”¹⁴ or to “objects launched into space in which NASA has lead involvement and control or has partial involvement with control over design or operations,”¹⁵ without ever mentioning that these standards could or should apply to private satellite operators as well. Thus, nothing in those standards themselves either suggests that they are intended to apply to a private satellite operator such as Globalstar, or prohibit a private satellite operator from de-orbiting at an altitude less than 2000 km.

Under its flexible, case-by-case approach for NGSO orbital debris mitigation, the Commission should approve Globalstar’s mitigation plan for its second-generation NGSO satellites. As shown in this proceeding, Globalstar’s planned disposal orbit meets or exceeds all published Commission requirements. Moreover, requiring that Globalstar now meet a 2000 km disposal orbit requirement would not materially decrease the risk of a collision or any other harm as compared to a 1535 km disposal orbit.

Moreover, it would not serve the public interest to, in effect, retroactively convert the general guideline for NGSO satellite disposal into a hard and fast minimum altitude requirement.

¹² 47 C.F.R. § 25.114(d)(14).

¹³ *Id.* at 11593-94 ¶ 66, 11598-601, ¶¶ 77-82; 47 C.F.R. § 25.283(a) and (d); *see also* Order and Authorization, *SES Americom, Inc.*, 20 FCC Rcd 11542, 11545 ¶ 15 n.16 (IB, 2005).

¹⁴ NASA Safety Standard – Guidelines and Assessment Procedures for Limiting Orbital Debris, NSS 1740.14 (Aug. 1995) at 6-3.

¹⁵ NASA Technical Standard – Process for Limiting Orbital Debris, NASA-STD-8719.14 (Sept. 2009) at 10.

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Indeed, imposing a minimum altitude requirement now would raise significant issues of detrimental reliance and notice under the Administrative Procedures Act.¹⁶

In January 2005, less than seven months after the *Orbital Debris Order* was released, the Commission unconditionally approved Globalstar's application describing the planned satellite graveyard orbit as 1514 +/- 2 km for its first-generation replacement satellites without any indication that such a storage orbit would fail to meet FCC policy objectives.¹⁷ Significantly, the Commission specifically inquired about the possibility for Globalstar's satellites to reach a 2000 km disposal altitude.¹⁸ In its reply, and subsequent amendment to its application, Globalstar explained how most of its satellites "do not have sufficient fuel reserves to be raised to 2000 km or to be lowered for re-entry" within the 25-year guideline.¹⁹ Globalstar also described the detrimental effects on satellite service life caused by disposal orbits higher than 1514 km.²⁰ In granting Globalstar's application, the Commission gave no indication of a problem with Globalstar's plans, stating only that "Globalstar is authorized to... perform end-of-mission

¹⁶ See *Orbital Debris Order*, 19 FCC Rcd at 11567 ¶ 78 ("application of an agency's rule is impermissibly retroactive when it would ... increase a party's liability for past conduct" (*quoting Celtronix Telemetry, Inc. v. FCC*, 272 F.3d 585, 588 (D.C. Cir. 2001))). See also *Sprint Corp. v. FCC*, 315 F.3d 369, 374 (D.C. Cir 2003) (formal notice and comment is required when an agency changes the "rules of the game" such that "additional obligations" are created); 5 U.S.C. §§ 551, 553.

¹⁷ See Stamp Grant, File Nos. SAT-MOD-20030606-00098 and SAT-AMD-20050105-00003 (granted on Jan. 28, 2005) and Exhibit B, File No. SAT-MOD-20030606-00098 (filed June 4, 2003) ("*2003 Exhibit B*") and Exhibit B Amendment, File Nos. SAT-MOD-20030606-00098, SAT-AMD-20050105-00003 (filed Jan. 5, 2005) ("*2005 Exhibit B Amendment*"). In its application, Globalstar explained how the satellite manufacturer had recommended a graveyard orbit of between 1500 to 1600 km since "this altitude is already being used for storage purposes and because it is relatively undesirable for active telecommunications purposes because of the adverse radiation environment." *2003 Exhibit B* at 1-2.

¹⁸ Letter from Thomas S. Tycz, Chief, Satellite Division, International Bureau, to William D. Wallace, Counsel to Globalstar, L.P., Mar. 26, 2004 (File No. SAT-MOD-20030606-0098).

¹⁹ Letter from William D. Wallace, Counsel to Globalstar, L.P., to Thomas S. Tycz, Chief, Satellite Division, International Bureau, Apr. 12, 2004 (File No. SAT-MOD-20030606-0098); *2005 Exhibit B Amendment* at 2.

²⁰ *2005 Exhibit B Amendment* at 5.

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satellite disposal operations... in accordance with the terms, conditions, and technical specifications set forth in the amended application and the Commission's rules."²¹

In 2005, Globalstar had also begun designing its second-generation constellation satellites and had no reason to believe that these satellites might have to adhere to some new and different bright-line disposal altitude requirement.²² Given the long lead-times involved in design and launch of satellites, the Commission should honor the debris mitigation plan it authorized in 2005 and approve Globalstar's current plan for disposing of its second-generation satellites.

In sum, the Commission should approve Globalstar's plan for disposing of its satellites. The propulsion system of Globalstar's satellites will remain sealed post-mission and does not create any material risk of spacecraft fragmentation. Further, the disposal altitude is also appropriate because it will be sufficiently stable to remain out of LEO and GEO, and avoid physical interference with the highly utilized MEO orbits. Finally, Globalstar's planned disposal altitude would not materially increase the risk of a collision or any other harm as compared to a 2000 km disposal orbit.

Please do not hesitate to contact me with any questions.

Respectfully submitted,

/s/ Samir Jain

Samir Jain
Counsel to Globalstar Licensee LLC

Encl.

²¹ 2005 Grant.

²² Globalstar's first-generation replacement satellites launched in 2007 were ground spares that were part of the constellation launched between 1998 and 2000 – four to six years before the Commission issued its 2004 *Orbital Debris Order*. Even if the Commission had made a 2000 km disposal altitude requirement explicit in 2004, it would have been impractical for Globalstar to modify these ground spares.