Executive Summary

Iridium is in the process of replacing its original Block 1 satellite constellation, first licensed in 1995, with its ground-breaking second-generation Iridium NEXT constellation. To put it mildly, replacing 66 operational non-geostationary satellites – while maintaining high-quality service, reliability, and global coverage – is an extraordinarily complex and unprecedented engineering feat. Iridium NEXT will unleash more bandwidth, higher throughput speeds, and innovative products and services, such as the lifesaving ability to track aircraft anywhere on earth. During and after the transition to Iridium NEXT, Iridium will continue to maintain high performance, reliability, and truly global coverage for all existing Iridium services and solutions.

Iridium files this request for special temporary authority ("STA") to obtain additional flexibility in managing its spacecraft fleet during the constellation replacement process. The flexibility will serve the public interest by promoting safe space operations and helping to ensure continuity of service to Iridium's customers all across the globe.

Pursuant to Iridium's request, the Commission has granted Iridium a 30-day STA to keep one first-generation ("Block 1") satellite in a temporary storage orbit. As the first-generation constellation is replaced, however, Iridium will need to place other Block 1 satellites in a storage orbit to ensure that the most robust satellites are in operation at all times. For the same reason, during the transition, Iridium may also need temporarily to move a Block 1 satellite directly into the slot of another Block 1 satellite that is being deorbited. Accordingly, Iridium requests 180-day special temporary authority to:

- keep up to 12 first-generation satellites in a 760 km storage orbit; and
- maneuver Block 1 satellites to replace other Block 1 satellites on a temporary basis.

The satellites chosen for the storage orbit will be the most robust and the least likely to suffer an anomaly that would require any change to Iridium's previously approved orbital debris mitigation plan. The need to use the storage orbit for first generation satellites will cease after the entire Iridium NEXT operating constellation (including spares) has been launched, tested and demonstrated to be operating successfully. Grant of the STA will provide Iridium's engineers with the flexibility to complete the extraordinary transition to Iridium NEXT safely and efficiently, and will ensure continuity of service for Iridium's users, including the critical needs of the U.S. military and the public safety community. Importantly, Iridium will continue to comply fully with its existing deorbit obligations.

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

Application of	)	
	)	
Iridium Constellation LLC	)	Call Sign: S2110
	)	
For Special Temporary Authority	)	File No. SAT-STA-2017_____
	)	

APPLICATION FOR SPECIAL TEMPORARY AUTHORITY

On March 31, 2017, the Commission granted Iridium Constellation LLC ("Iridium") special temporary authority ("STA") through April 29, 2017 to modify its authorization for its "Big LEO" band non-geostationary satellite orbit ("NGSO") constellation (call sign S2110) to keep one first-generation satellite in a temporary 760 km storage orbit.[1] To ensure complete continuity of service as the entire Iridium first-generation satellite constellation is replaced, Iridium will need to place additional first-generation ("Block 1") satellites in storage orbits to be available as spares and maneuver some Block 1 satellites into slots to replace temporarily other Block 1 satellites that are being deorbited. The goal of these operations is to keep the most robust satellites in operational mode at all times and to remove from service and prepare for de-orbit less robust satellites. Accordingly, Iridium hereby requests STA for one hundred eighty (180) days to keep up to twelve first-generation satellites in the temporary storage orbit[2] and to maneuver certain first-generation satellites within a plane to replace other Block 1 satellites.

[1] *See* Iridium Constellation LLC, SAT-STA-20170223-00020 (granted Mar. 31, 2017). *See also* Letter from Scott Blake Harris, Harris, Wiltshire & Grannis, LLP to Jose Albuquerque, FCC (Mar. 24, 2017) ("Supplemental Letter").

[2] *See* 47 C.F.R. § 25.120(b)(2). Iridium anticipates that this request will be placed on Public Notice prior to grant. Iridium also will file a request for 30-day STA extension of its existing authority for one satellite and additional authority to place three more satellites replaced in the first launch into the temporary storage orbit. In addition, Iridium will file a request for modification of its license to cover use of the storage orbit for the entire constellation

Grant of the STA serves the public interest. Iridium is engaged in the unprecedented endeavor of deploying an entirely new global satellite constellation at the same time that it retires an older global satellite system. During this transition, it is imperative that Iridium have the most robust among its satellites in operation at all times and that any less robust satellites be taken out of service and deorbited first. It is also important that Block 1 satellites be available to provide service if a new satellite develops any unexpected temporary communication problems. Providing Iridium with the flexibility to maneuver its healthiest Block 1 satellites to a storage orbit or another slot location within a plane will ensure the availability of sufficient engineering resources to coordinate the safe movement of Iridium's satellites during the deorbiting process and eliminate the risk that this unique replacement effort will have any adverse impact on Iridium service. Until a particular plane is fully populated with operational Iridium NEXT mission satellites and spares, only Block 1 spares can serve this purpose. The first-generation satellites Iridium seeks to keep in-orbit will be the least likely to suffer an anomaly that would hinder them from being deorbited as required by, and without any change to, the previously approved orbital debris mitigation plan.[3]

I. BACKGROUND AND REQUEST FOR SPECIAL TEMPORARY AUTHORITY

On January 1, 1995, the FCC authorized Iridium's predecessor-in-interest to launch and operate an NGSO mission constellation of 66 satellites in the Big LEO band along with 12 in-orbit spares.[4] On August 1, 2016, the Commission authorized Iridium to construct, deploy and

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replacement based upon the information and experience it gains from the replacement of Block 1 satellites with Iridium NEXT satellites in these first few launches.

[3] *See Iridium Constellation LLC Application for Modification of Big LEO License to Change the Orbital Debris Mitigation Plan*, 29 FCC Rcd 9422 (I.B. 2014) ("Revised Orbital Debris Order").

[4] *See Application of Motorola Satellite Communications, Inc.*, Order and Authorization, 10 FCC Rcd 2268, ¶ 25 (IB 1995).

operate its second-generation satellite constellation, commonly known as Iridium NEXT, with 66 space stations and up to 15 "second-generation in-orbit spare satellites."[5] Specifically, the grant "is based on a planned one-for-one substitution of first-generation satellites by second-generation satellites, but does not preclude Iridium seeking authorization at a later date to retain some first-generation satellites as spares."[6]

This 180-day STA seeks authority to retain up to 12 Block 1 satellites in a storage orbit upon their substitution by a second-generation satellite. Iridium began its phased launch of second-generation satellites with the successful launch and delivery of 10 satellites to a temporary 625 km parking orbit in January 2017.[7] Following positioning to the 780 km mission orbit and completion of in-orbit testing, second-generation satellites from this and subsequent launches will be brought into operation and replace first-generation satellites in specific orbital planes and slots. Under the STA, Iridium seeks to move certain of the replaced first-generation satellites to a storage orbit of approximately 760 km. There, these first-generation satellites can serve as spares to support Iridium's phased deployment of Iridium NEXT. While positioned in storage orbit, the first-generation satellites will not be co-located and will not operate as part of Iridium's mission constellation.[8] Iridium also requests the flexibility to be able to maneuver certain first-generation satellites, after replacement by Iridium NEXT satellites, to a new slot where they will replace less robust first-generation satellites.

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5 *See generally Iridium Constellation LLC, Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, Order and Authorization, 31 FCC Rcd. 8675, ¶¶ 45-47 (Aug. 1, 2016) ("Iridium NEXT Order").

6 *Id.*, ¶ 5 n.22.

7 *Iridium Announces Successful First Launch of Iridium NEXT Satellites*, Iridium.com (Jan. 14, 2017), *available at* http://investor.iridium.com/releasedetail.cfm?releaseid=1007978.

8 *Cf.* File No. SAT-MOD-20120813-00128.

Iridium's decision about which satellites to replace first is based on the overall health and safety of the operating constellation. With each launch, ten Iridium NEXT satellites go to one of the six planes in which the Iridium constellation operates. The first launch was to plane number 6, primarily because there was an open slot (i.e., a slot where there was no operating satellite). Because Iridium's launch provider can deliver ten satellites at a time to a given orbital plane, some Block 1 satellites that are operating most efficiently and have ample fuel will be replaced early in the process, and thus would be useful as spares. Iridium intends to place in storage orbit satellites whose communications and other systems are functioning well, and that have enough fuel to (a) move to a storage orbit, (b) move back into a mission orbit if needed, and (c) deorbit in a timely way after they are no longer needed in the mission orbit.

For example, as a result of the first launch, Iridium hopes to move four replaced first-generation satellites to the temporary storage orbit and deorbit three satellites immediately from mission orbit.[9] Of the satellites temporarily placed into storage orbit, SV077 will be deorbited as soon as safely possible based on the availability of engineering resources and experience gained from the Iridium NEXT operations, which is anticipated to be in approximately 2-3 months. The remaining three satellites in the storage orbit would be maintained as spares for a longer period of time pending the successful launch and operation of additional Iridium NEXT satellites. The plan for each subsequent plane will be similar.

[9] In the first launch, one Iridium NEXT satellite filled a vacant slot and two others are drifting to an adjacent plane.

II. PUBLIC INTEREST STATEMENT

A. Grant of this STA Request Will Serve the Public Interest.

As the Commission has said, Iridium NEXT will "provide mobile voice and data services to end users on a network with improved voice quality and enhanced data transmission speeds."[10] Allowing Iridium the flexibility sought in this STA application will backstop Iridium's phased transition to Iridium NEXT and its provision of these beneficial service enhancements. Use of the storage orbit will also provide time separation between the deorbits of the first-generation satellites and ensure the availability of engineering resources needed to coordinate the safe movement of multiple satellites.

Moreover, the storage orbit and request to maneuver first-generation satellites is temporary, and the satellites Iridium chooses for use as spares will be those with the highest functioning systems on all measures. As Iridium subsequently launches second-generation satellites, Iridium will de-boost and de-orbit the first-generation satellites on a rolling basis. When the entire Iridium NEXT constellation and spares have been launched, tested and demonstrated to be operating successfully, the need for Block 1 satellites in-orbit will cease.

Grant of this STA request also poses no interference risk. The proposed location of the first-generation spare satellite orbit ensures safe station-keeping without any overlap in orbital position. Further, upon replacement by a second-generation satellite in the mission constellation, a first-generation satellite will suspend mission operations and will not be co-located and operated in tandem with the second-generation satellite.

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[10] Iridium NEXT Order, ¶ 1.

B. Iridium Will Continue to Comply with the Approved Orbital Debris Mitigation Plan.

In 2014, the Commission issued a revised orbital debris mitigation plan for Iridium's Block 1 satellites.[11] Under the revised plan, the agency allowed Iridium to extend the post-mission atmospheric re-entry period to 25 years for up to ten satellites, while the rest of the Block 1 fleet remained subject to the one-year re-entry period approved in 2002. Iridium has abided by this plan. In June 2016, Iridium removed SV039 from its mission orbit for purposes of deorbit and filed the required notification to the FCC.[12] This month, Iridium also commenced the deorbit of the first Block 1 satellite replaced by an Iridium NEXT satellite and will timely file the required notification to the FCC.

The flexibility sought by this STA will not affect Iridium's continued compliance with its existing orbital debris mitigation plan. Specifically, Iridium will deorbit no more than ten Block 1 satellites under the approved atmospheric re-entry period of up to 25 years. Iridium will use all available fuel to achieve the lowest perigee altitude possible for each deorbited satellite. Indeed, Iridium anticipates that many of the ten satellites approved for an atmospheric re-entry period of up to 25 years will actually achieve a perigee altitude resulting in a significantly faster atmospheric re-entry period of a few years. As stated above, Iridium will keep only the most robust Block 1 satellites in storage orbit following their replacement by Iridium NEXT satellites. These Block 1 satellites will be the least likely to suffer an anomaly that would diverge from the approved orbital debris mitigation plan. In sum, Iridium will continue to comply fully with its existing, approved deorbit plan.

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11 *See generally* Revised Orbital Debris Order.

12 *See* Letter from Maureen C. McLaughlin, Iridium to Mr. Jose Albuquerque, Chief, Satellite Division, International Bureau, Federal Communications Commission (June 29, 2016).

III. CONCLUSION

Iridium respectfully requests that the Commission grant this 180-day STA to permit Iridium to retain up to 12 first-generation satellites in a temporary storage orbit and to maneuver first-generation satellites to different orbital slots to replace other first-generation satellites as needed.

Respectfully submitted,

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