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Waiver Requests

The Commission may waive any of its rules if there is “good cause” to do so.¹ In general, a waiver is appropriate if (1) special circumstances warrant a deviation from the general rule; and (2) such deviation would better serve the public interest than would strict adherence to the rule.² Generally, the Commission will grant a waiver of its rules when doing so would not undermine the policy objective of the rule in question and would otherwise serve the public interest.³

In this case, the development of an efficient, flexible and non-toxic space transportation infrastructure, along with the significant benefits it provides, – including, the potential to assist in orbital debris risk mitigation – constitutes a special circumstance warranting waiver of the applicable Commission rules.

A. U.S. Table of Frequency Allocations

Section 25.112(a)(3) of the Commission’s rules provides that an application is deemed defective if an applicant fails to include a waiver request when seeking authority to operate a space station in a frequency band not allocated for such operations under the ITU Radio Regulations. The Commission has specifically stated, with respect to waiver requests to permit non-conforming uses, that it will grant such waivers when there is minimal potential for interference with authorized services and when the non-conforming operator accepts any interference from authorized services.⁴ This standard for permitting non-conforming use and

¹ See 47 C.F.R. § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

² See *Northeast Cellular*, 897 F.2d at 1166.

³ See *WAIT Radio*, 418 F.2d at 1157.

⁴ *Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation by Iridium Constellation LLC*, Order and Authorization, 31 FCC Rcd. 8676 at ¶ 21 (IB 2016); see also *Applications by Orbcomm License Corp. for Authority to Modify its Non-Voice, Non-Geostationary Satellite System et al.*, Order and

waiver of the rule has been applied to operations that do not conform to both the U.S. Table of Allocations and ITU allocations.⁵ As discussed below, Turion has demonstrated that its proposed operations will not cause harmful interference and that it will accept interference from other systems authorized to use the requested spectrum. Accordingly, waiver of the applicable rule is appropriate in each instance outlined in this application.

1. 2025-2110 MHz Uplink

This frequency band is allocated to space operations and EESS, *inter alia*, across all ITU regions. In the United States, space operations in this band are limited to federal operators, while commercial EESS operations are permitted on a case-by-case basis, subject to the condition that such use must not cause harmful interference to authorized services.⁶ For the DROID mission, Turion proposes to use the 2025-2110 MHz band primarily for TT&C, along limited payload transmissions in support of its RPO and EESS objectives.

Accordingly, Turion respectfully requests a waiver of the U.S. Table of Allocations and 47 C.F.R. § 25.112(a)(3), to the extent necessary, to permit such use for TT&C and related

Authorization, 23 FCC Rcd. 4804 at ¶ 15 (IB & OET 2008); *The Boeing Company*, Order and Authorization, 16 FCC Rcd. 22645 at ¶ 12 & n.48 (IB & OET 2001) (citing *Fugro-Chance, Inc.*, Order and Authorization, 10 FCC Rcd. 2860 at ¶ 2 (IB 1995); *Motorola Satellite Communications, Inc.*, Order and Authorization, 11 FCC Rcd. 13952 at ¶ 11 (IB 1996)).

⁵ See Stamp Grant, Loft Orbital Solutions Inc., IBFS File Nos. SAT-LOA-20190807-00072 and SAT-AMD-20200527-00063, at Conditions 8-9 (Oct. 8, 2020) (granting waiver of 47 C.F.R. § 2.106 to allow use of commercial mobile-satellite service spectrum for intersatellite navigation correction service; granting waiver of 47 C.F.R. § 2.106 to allow use of commercial mobile-satellite service spectrum for intersatellite service on an unprotected, non-interference basis); Stamp Grant, Astro Digital US Inc., IBFS File No. SAT-LOA-20170508-00071 at n. 3 (granted in part Dec. 14, 2017) (granting use of commercial mobile-satellite service frequencies for intersatellite service based on showing of non-harmful interference); Stamp Grant, Spaceflight, Inc., IBFS File No. SAT-LOA-20220111-00007, at Condition 7 (granted in part May 10, 2022) (granting waiver of 47 C.F.R. 25.112(a)(3) to permit use of frequencies for space operation service in a frequency band allocated for other services, conditioned on operations on a non-interference, unprotected basis); *c.f. The Boeing Company Application for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service*, Order and Authorization, IBFS File Nos. SAT-LOA-20170301-00028, SAT-AMD-20170929-00137, SAT-AMD-20180131-00013 ¶¶ 12- 15 (rel. Nov. 3, 2021) (denying waiver of 47 C.F.R. § 25.112(a)(3) where applicant failed to provide sufficient technical information demonstrating that it could operate on a noninterference, unprotected basis).

⁶ See 47 C.F.R. § 2.106 n. US347.

testing.⁷ Given the mission's limited duration and the restricted nature of its use of the coordinated frequencies, granting this waiver would serve the public interest. Turion therefore respectfully submits that a waiver is appropriate and warranted in this case.

2. 2200-2290 MHz Downlink

This band is allocated internationally for EESS, space research, and space operations.⁴⁸ In the United States, this band is allocated primarily for Federal EESS, space research, and space operations. S-band downlink will only communicate with ground stations outside the United States. Turion will begin coordination with Federal operators in this band to ensure no harmful interference would be caused to their operations by such transmissions. Given the mission's limited duration and the restricted nature of its use of the coordinated frequencies, granting this waiver would serve the public interest. Turion requests a waiver of the Table of Allocations and to operate in these frequencies.

3. 1618.725-1626.5 MHz Band

The 1618.725-1626.5 MHz band is allocated for MSS,⁸ an allocation which can include the use of inter-satellite links.⁹ However, the MSS allocation in the 1618.725-1626.5 MHz band is limited to communications between earth stations and non-federal space stations.¹⁰ Turion therefore requests a waiver to communicate with the Iridium system in this band.

⁷ Waivers of the U.S. Table of Frequency Allocations are generally granted "when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the nonconforming operator accepts any interference from authorized services." *The Boeing Company*, Order and Authorization, 16 FCC Rcd. 22645 at ¶ 12 & n.48 (IB & OET 2001) (citing *Fugro-Chance, Inc.*, Order and Authorization, 10 FCC Rcd. 2860 at ¶ 2 (IB 1995); *Motorola Satellite Communications, Inc.*, Order and Authorization, 11 FCC Rcd. 13952 at ¶ 11 (IB 1996)).

⁸ See, 47 C.F.R. § 2.106.

⁹ See, 47 CFR § 25.103.

¹⁰ See 47 C.F.R. § 2.106 n. US319.

Here, a waiver is justified because Iridium is the sole user of the band for earth station to space station communications. Turion is Iridium's customer and will coordinate with Iridium to ensure that these communications do not cause harmful interference to Iridium's conforming MSS operations in the band. All transmissions between DROID and Iridium will only occur on frequencies assigned by Iridium to the spaceborne Iridium modem. In the unlikely event that there is a report of harmful interference, Turion will cease transmissions in the band. Additionally, the Commission has granted similar waiver requests for other applicants.¹¹

Because of the above mitigation measures to prevent harmful interference, the Commission should grant Turion's request for a waiver.

B. Small Satellite Streamlined Rules

Turion respectfully requests that this application be processed pursuant to the Commission's small satellite streamlined licensing rules under Section 25.122 of the Commission's rules.¹² In order to qualify for streamlined process, Turion requests a waiver of 25.122(c)(8) and 25.122(c)(12) of the Commission's rules. Grant of this waiver is in the public interest because DROID otherwise complies with the requirements of 25.122 of the Commission's rules and can operate consistent with the orbital debris mitigation and spectrum use requirements. First, although DROID's probability of human casualty from portions of the spacecraft surviving re-entry is greater than zero as articulated in 25.122(c)(8), DROID is capable of conducting a controlled reentry in a large, uninhabited area of the Pacific Ocean, thereby mitigating the risk and achieving the Commission's goal. Second, although DROID's individual mass exceeds the

¹¹ See Stamp Grant, Sidus Space, Inc., ICFS File No. SAT-MOD-20241104-00248, Call sign: S3175 (Granted Jan. 15, 2025).

¹² 47 C.F.R. § 25.122(c)(12).

requirement articulated in 25.122(c)(12), the rules contemplate a total system mass of 1,800 kg for a ten-satellite small satellite constellation. DROID remains well within this mass threshold.

The Commission implemented section 25.122 in an effort to streamline the processing for space stations applications that would present relatively limited concerns regarding spectrum use and orbital debris mitigation.¹³ Below is a list of requirements for an applicant to qualify for the small satellite streamlining process:

Streamlined Rules Requirements¹⁴	Turion Certifications
(1) The space station(s) will operate only in non-geostationary orbit.	DROID will operate only in non-geostationary orbit.
(2) The total in-orbit lifetime for any individual space station will be six years or less.	DROID will de-orbit in less than six years.
(3) The space station(s): (i) Will be deployed at an orbital altitude of 600 kilometers or below; or (ii) Will maintain a propulsion system and have the ability to make collision avoidance and deorbit maneuvers using propulsion.	DROID will be deployed to a maximum orbit of 530 km. DROID also has a propulsion system and will have the ability to make collision avoidance and deorbit maneuvers using propulsion.
(4) Each space station will be identifiable by a unique signal-based telemetry marker distinguishing it from other space stations or space objects.	DROID will have a unique transmitting telemetry channel, allowing it to be identifiable during commissioning and in-orbit activities.
(5) The space station(s) will release no operational debris.	Turion will not release any operational debris.
(6) The space station operator has assessed and limited the probability of accidental explosions, including those resulting from the conversion of energy sources on board the space station(s) into energy that fragments the spacecraft.	Turion has assessed and limited the probability of accidental explosions.

¹³ See e.g., *Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019) (Small Sat R&O”), ¶ 10. “The goal of this small satellite process is to enable satellites that have shorter missions, less intensive spectrum use, and lower risk of producing orbital debris to be licensed on a streamlined basis.”

¹⁴ See 47 C.F.R. 25.122.

(7) The probability of a collision between each space station and any other large object (10 centimeters or larger) during the orbital lifetime of the space station is 0.001 or less as calculated using current NASA software or other higher fidelity model.	The probability of collision between DROID and other large objects is 0, well below the Commission's threshold.
(8) The space station(s) will be disposed of post mission through atmospheric re-entry. The probability of human casualty from portions of the spacecraft surviving re-entry and reaching the surface of the Earth is zero as calculated using current NASA software or higher fidelity models.	For uncontrolled reentry, the risk of human casualty from surviving debris is 1:11700. Turion is capable of conducting a controlled reentry in a large, uninhabited area of the Pacific Ocean.
(9) Operation of the space station(s) will be compatible with existing operations in the authorized frequency band(s). Operations will not materially constrain future space station entrants from using the authorized frequency band(s).	DROID will be compatible with existing operations due to sporadic and narrow use of the band, coordinated by Turion's ground-station-as-a-service partner.
(10) The space station(s) can be commanded by command originating from the ground to immediately cease transmissions and the licensee will have the capability to eliminate harmful interference when required under the terms of the license or other applicable regulations.	DROID can be commanded by command originating from the ground to immediately cease transmissions and Turion will have the capability to eliminate harmful interference when required under the terms of the license or other applicable regulations.
(11) Each space station is 10 cm or larger in its smallest dimension.	DROID is 10 cm or larger in its smallest dimension.
(12) Each space station will have a mass of 180 kg or less, including any propellant.	No, but the mass of DROID will not exceed the total mass of a ten-satellite system where each satellite is 180 kg.
(13) The probability that any individual space station will become a source of debris by collision with small debris or meteoroids that would cause loss of control and prevent disposal is 0.01 (1 in 100) or less; and	The probability is less than 1 in 100.
(14) Upon receipt of a space situational awareness conjunction warning, the licensee or operator will review and take all possible steps to assess the collision risk and will mitigate the collision risk if necessary.	Turion certifies that if it receives a conjunction warning, Turion will review and take all possible steps to assess the collision risk, and will mitigate the collision risk if necessary

4. 25.122(c)(8)

The Commission included the human casualty requirement to ensure that applications for the small satellite streamlining process were consistent with less need for further inquiry into potential legal and financial arrangements due to liability concerns.¹⁵

Turion notes that it has provided in this application the option of conducting a controlled reentry in a large, uninhabited area of the Pacific Ocean, as a means to mitigate the human casualty risk. This alternative would alleviate the Commission's concern of exposing the United States Government to potential legal and financial liability which require additional factual inquiry.¹⁶

Accordingly, Turion respectfully submits that granting a waiver of 25.122(c)(8) and allowing the DROID application to proceed under the small satellite streamlined process would serve the public interest and align with the Commission's policy objectives.

5. 25.122(c)(12)

At the time, the Commission instituted the mass requirement to ensure that the satellites considered for the small satellite streamlining process were relatively small.¹⁷ The Commission felt that this would filter out any systems that are not appropriate for the streamlined process.¹⁸

¹⁵ See e.g., *Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019) (Small Sat R&O"), ¶ 51. "This certification is generally consistent with applications that can be processed on a streamlined basis, as it typically indicates that no additional factual inquiry by the Commission or discussion of insurance and liability arrangements, for example, is necessary."

¹⁶ See e.g., *Streamlining Licensing Procedures for Small Satellites*, IB Docket No. 18-86, Notice of Proposed Rulemaking, 33 FCC Rcd 4152 (2018), ¶ 39. "If a statement indicates a risk of human casualty, the spacecraft could result in a future claim being presented to the United States under the relevant United Nations Outer Space Treaties.¹²⁸ In light of the casualty risk, it may be necessary to consider satellite modifications that could reduce the risk to zero, or insurance and liability arrangements."

¹⁷ See e.g., *Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019) (Small Sat R&O"), ¶ 51. "We find that this maximum mass characteristic is useful to demarcate a particular type of licensee—a small satellite. Spacecraft are generally grouped according to their mass and mass is also easier to measure in many respects than cross-surface section area, which may change depending on what parts of the spacecraft are deployed following launch. Alongside the other qualifying characteristics, a maximum mass helps to act as a check on the types of operations that may be licensed in a streamlined fashion."

¹⁸ *Id.* at 52.

However, Turion notes that the Commission also adopted Section 25.123, which permits a spacecraft with a mass of up to 500 kg to qualify for streamlined processing under certain conditions. DROID, with a mass of 474.35 kg, falls within that limit. Additionally, the Commission has proposed that in-space service, assembly and manufacturing spacecraft (“ISAM”) activities may also be appropriate candidates for streamlined treatment.¹⁹

Turion further notes that DROID’s mass is due in part to the specific demands of its on-orbit mission, such as carrying a customer spacecraft and hosted payloads, rather than by the characteristics of its onboard communication systems. As a result DROID’s mass is not reflective of its spectrum use, which closely mirrors the spectrum use of other systems that have sought and received streamlined treatment.²⁰

Additionally, the small satellite streamlined process permits up to ten spacecraft per system, permitting a single licensee to potentially launch up to 1,800 kg of mass. If an applicant is able to meet the non-mass requirements of Section 25.122, it has shown that it can comply with the applicable requirements for the use of spectrum and orbital debris mitigation. Therefore, operation of a single spacecraft exceeding the 180 kg mass limit but within the 500 kg mass limit of Section 25.123 and the total mass limit of 1,800 kg that can be authorized for a small satellite system does not contravene the intent of the small satellite streamlining rules. Indeed, such a waiver would streamline the application process for DROID, which presents relatively limited concerns regarding spectrum use and orbital debris mitigation.²¹

¹⁹ See *Facilitating Capabilities for In-space Servicing, Assembly, and Manufacturing*, Notice of Proposed Rulemaking, FCC 24-21, IB Docket Nos. 22-271 and 22-272 (rel. Feb. 16, 2024) (“ISAM NPRM”), ¶ 14.

²⁰ See .e.g. Grant, Turion Space Corp., File Number SAT-LOA-20240516-00104, Call sign: S3198 (Granted Dec. 26, 2024).

²¹ See e.g., Small Sat R&O, ¶ 10. “The goal of this small satellite process is to enable satellites that have shorter missions, less intensive spectrum use, and lower risk of producing orbital debris to be licensed on a streamlined basis.”

Accordingly, Turion respectfully submits that granting a waiver of 25.122(c)(12) and allowing the DROID application to proceed under the small satellite streamlined process would serve the public interest and align with the Commission’s policy objectives.

C. Alternative to Small Satellite Streamlined Rules

In the event the Commission is not able to grant waiver requests for 25.122(c)(8) and 25.122(c)(12) of the small satellite streamlined licensing rules, Turion requests the following waivers in the alternative.

6. Modified Processing Round Rules

Turion requests that this application be processed pursuant to the first-come, first-served procedure adopted for “GSO-like satellite systems” under Section 25.158 of the Commission’s rules.²² To the extent necessary to allow for such processing, Turion also requests waiver of Sections 25.156 and 25.157 of the Commission’s rules, which stipulate the processing of “NGSO-like satellite systems” under a modified processing round framework.²³

The Commission has not required modified processing rounds and essentially allowed similar in-orbit servicing missions²⁴ to be processed on a first-come, first-served basis on multiple occasions.²⁵ Turion’s spectrum use would be limited in time and location, and Turion is capable of

²² 47 C.F.R. § 25.158.

²³ 47 C.F.R. §§ 25.156 and 25.157.

²⁴ See *Facilitating Capabilities for In-space Servicing, Assembly, and Manufacturing*, Notice of Proposed Rulemaking, FCC 24-21, IB Docket Nos. 22-271 and 22-272 (rel. Feb. 16, 2024) (“ISAM NPRM”), ¶ 13 (“Servicing activities include but are not limited to *in-space inspection*, life-extension, repair, refueling, alteration, and orbital transfer of a client space object, including collection and removal of debris on orbit.” emphasis added)

²⁵ Application of Spaceflight, IBFS File No. SAT-STA-20210205-00017 (granted May 28, 2021); Application of Spaceflight, IBFS File No. SAT-STA-20180523-00042 (granted October 12, 2018); Application of Spaceflight, IBFS File No. SAT-STA-20150821-00060 (granted October 26, 2016); Application of Momentus Space LLC, IBFS File No. SAT-STA-20211216-00195 (granted April 28, 2022); Application of Momentus Space LLC, IBFS File No. SAT-LOA-20220504-00047 (granted

both sharing the spectrum on which it proposes to operate and operating on a non-interference basis. A grant of Turion's requested authorization would not preclude later grants of applications for the same spectrum. Accordingly, the underlying basis of the processing round rules would not be served by applying them under these circumstances here.

7. Milestone and Bond Requirements

Turion also requests waiver of the Commission's milestone and bond requirements for NGSO systems.²⁶ The Commission's bond requirements have been developed to prevent licenses from warehousing spectrum.²⁷ Turion does not seek mutually exclusive use of the spectrum used, as discussed above. A grant of Turion's requested authorization would not preclude other operators from seeking authorization to use the frequency bands proposed by Turion. Accordingly, there is no basis to impose the milestone or bond requirements.

Additionally, as the Commission has recognized, the anticipated time period for implementation and overall length of time that individual satellites are expected to operate are relevant considerations with regards to public interest benefits of bond requirements.²⁸ Here, the

November 15, 2022); Application of Momentus Space LLC, IBFS File No. SAT-LOA-20221009-00131 (granted Feb. 27, 2022, reissued Mar. 29, 2023).

²⁶ See 47 C.F.R. §§ 25.164, 25.165.

²⁷ See *Comprehensive Review of Licensing and Operating Rules for Satellite Services*, Second Report and Order, 30 FCC Rcd. 14713 at ¶ 53 (2015) (citing, e.g., *TMI Communications and Company, Limited Partnership and TerreStar Networks Inc., Application for Review and Request for Stay*, Memorandum Opinion and Order, 19 FCC Rcd. 12603 at ¶ 2 (2004); *PanAmSat Licensee Corp., Application for Authority to Construct, Launch, and Operate a Ka-Band Communications Satellite System in the Fixed-Satellite Service at Orbital Locations 58° W.L. and 125° W.L.*, Memorandum Opinion and Order, 16 FCC Rcd. 11534 at ¶ 12 (2001)).

²⁸ *In the Matter of Streamlining Licensing Procedures for Small Satellites*, Notice of Proposed Rulemaking, 33 FCC Rcd. 4152 at ¶ 51 (2019). The ultimate rule adopted by the Commission for small satellites provides that individual satellites must have a lifetime from deployment of six years or less. 47 C.F.R. § 25.123(b)(2).

mission life for DROID, a single spacecraft, is expected to be less than six years, in line with the requirements for small satellite streamlining applications.²⁹

Another consideration that underlies the Commission's bond requirements is the Commission's concern not to impose a cost that is disproportionate to the overall cost of the mission.³⁰ The Commission has stated: "we note that the cost of maintaining a \$3 million or \$5 million final bond during satellite construction is nominal in comparison with the cost to implement licensed space stations, which generally cost several hundred million dollars each to launch and operate."³¹ For NGSO constellations with costs to construct and launch measured in the billions, a \$5 million bond and associated fees might indeed be viewed as "nominal." But, for a single satellite with a limited mission duration, the bond and associated fee, even for a short period of time, would be excessive and would be a disproportionate and unfair cost. For these reasons, Turion submits that waiver of the milestone and bond requirements is justified.

²⁹ Id.

³⁰ See *In the Matter of Amendment of the Commission's Space Station Licensing Rules and Policies*, First Order on Reconsideration and Fifth Report and Order, 19 FCC Rcd. 12637 at ¶¶ 28-31 (2004).

³¹ *In the Matter of Comprehensive Review of Licensing and Operating Rules for Satellite Services*, Second Report and Order, 30 FCC Rcd. 14713 at ¶ 60 (2016).

