Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Momentus Inc.	)	File No. SAT-STA_________
	)	
Application for Special Temporary Authority to Launch and Operate an In-Space Transportation Spacecraft	)	
	)	

APPLICATION FOR SPECIAL TEMPORARY AUTHORITY

Philip Hover-Smoot
Associate General Counsel
Chief Ethics & Compliance Officer
Momentus Inc.
3050 Kenneth Street
Santa Clara, CA 95054
+1-415-254-1295

Counsel for Momentus Inc.

Dated: August 31, 2020

TABLE OF CONTENTS **Page**

Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Momentus Inc.	)	File No. SAT-STA-_________
	)	
Application for Special Temporary Authority to Launch and Operate an In-Space Transportation Spacecraft	)	
	)	
	)	
	)	

APPLICATION FOR SPECIAL TEMPORARY AUTHORITY

I. Introduction

By this application, Momentus Inc. ("Momentus") requests Special Temporary Authority, pursuant to 47 C.F.R. § 25.120, to launch and operate the Vigoride-2 ("VR-2") non-geostationary orbit spacecraft in low-Earth orbit and to transport and deploy multiple, separate customer payloads at a specified final orbital destination. VR-2 is the second demonstration mission for the Momentus inaugural spacecraft product and will operate in the S-band (2025-2110 MHz) for Space Operations (Earth-to-space) and in the X-band (8025-8400 MHz) for Space Operations (space-to-Earth). VR-2 is expected to be deployed from a Space Exploration Technologies Corporation ("SpaceX") Falcon-9 launch in February 2020, and the mission is expected to have a duration of 180 days, *i.e.*, from February 2021 to August 2021.[1] Unlike the VR-1 mission, the VR-2 is intended to carrying a more representative assortment of customer

[1] While Momentus is requesting authority to operate via STA for a period of 180 days, it is possible that the ability to communicate with the VR-2 may persist beyond the termination of the planned 180-day mission. In such event, Momentus will, if authorized at such time by FCC, be willing and able to continue TT&C communication with the VR-2 for post-mission collision avoidance and related space situational awareness purposes.

payloads, deliver those payloads to multiple sequential orbits, as well as perform a post-deployment series of demonstration maneuvers to exhibit the orbital adjustment capabilities of the Vigoride platforms.[2]

Momentus is a private U.S. company headquartered in Santa Clara, California. Momentus is engaged in the design, construction, and operation of in-space transportation spacecraft. Since its founding in 2017, Momentus has brought together a team of aerospace professionals, drawn from throughout the industry, united with the singular goal of changing how the world thinks about space transportation infrastructure. Through its revolutionary Vigoride, Ardoride and Fervoride spacecraft, each capable of transporting and delivering small satellites or other cargo to tailored orbital and - in the case of Ardoride and Fervoride - extra-orbital locations, Momentus will provide efficient and inexpensive "connecting flights" in space. The ability to customize orbits using Momentus spacecraft and services empower small satellite operators by enabling greater and lower-collision risk use of all orbits, including high-density orbits. Additionally, introducing the orbit flexibility of Momentus spacecraft and services into the existing commercial rideshare launch market can accelerate commercial space station deployments by expanding the orbital reach of existing launches, thereby increasing total ridership and contributing to lower launch prices. Cheaper, faster and smarter commercial space transportation has the capability to fundamentally change how space operators interact with on-orbit infrastructure. For all of these reasons, Momentus submits that the public interest would be served by grant of the application.[3]

---

[2] The VR-1 mission is the subject of a currently pending STA application. *See* Application of Momentus, Inc., IBFS File No. SAT-STA-20200609-0068 (submitted June. 8, 2020).

[3] A Momentus Inc. Ownership Exhibit is appended to this application as Exhibit 2. Additionally, Section 310(b)(4) of the Communications Act of 1934, as amended, establishes certain limitations on indirect foreign ownership and voting of certain common carrier and broadcast licensees. By definition, these

II. System Description

A. General System Descriptions

1. Vigoride VR-2 Spacecraft

The Vigoride spacecraft is a self-propulsive, free-flying spacecraft designed to transport and deploy customer payloads. The Vigoride spacecraft is capable of the transportation and deployment of dozens of individual payloads. For the second Vigoride demonstration mission, VR-2 will be transporting ten (10) individual payloads (individually, "Payload 1" through "Payload 9," and collectively, the "Payloads"), on behalf of ten (10) customers (collectively, the "Customers") along with three (3) deployers.[4] Table 1 below provides a summary of the payloads and customer information.

Payload:	Launched on behalf of:	Licensing Jurisdiction:	Size	Mass
BRONCOSAT-1[5]	Bronco Space	United States	1.5U	1.75kg
DODONA[6]	Lockheed Martin	United States	3.0U	5.0kg
GUARDIAN-ALPHA[7]	Orbital Astronautics, Inc.	United Kingdom	3.0U	5.0kg
NEPTUNO[8]	Deimos Engineering & Systems	Spain	3.0U	3.94kg

---

limitations do not apply to the non-broadcast, noncommon carrier operations of Momentus proposed in this application and thus responses to FCC Form 312 Questions 30 through 34 are not addressed in Exhibit 2.

[4] Two deployers are being transported for commercial customers launching their own constituent payloads. Each is detailed in Table 2, below. The remaining deployer is a 12U ISIS deployer, owned by Momentus, being used to deploy Momentus Payloads 1 through 10.

[5] BroncoSat-1 does not have onboard propulsion. Bronco Space is a student organization associated with Cal Poly Pomona University in Pomona, CA. Momentus is providing free launch services for the Bronco-Sat-1.

[6] The Lockheed Martin Dodona payload does not have onboard propulsion and is planned to be deployed at the 550km second primary orbit.

[7] The Guardian-Alpha payload has onboard liquid metal electric propulsion.

[8] The Neptuno payload has onboard propulsion – an IFM Nano thruster.

ORESAT0[9]	Portland State Aerospace Society	United States	1.0U	1.3kg
QMR-KWT[10]	Solar Space Ltd.	Bulgaria	1.0U	1.16kg
GOSSAMER[11]	LunaSonde	United Kingdom	1.0U	2.0kg
REVELA[12]	ARCA Dynamics	Italy	3.0U	5.0kg
FEES-2[13]	GP Advanced Projects S.r.l	Italy	0.5U	0.3kg
BHAARATHIYA-SAT[14]	SpaceKidz India	India	0.5U	0.8kg

Table 1: VR-2 Deployable Customer Payloads

Payload:	**Transported on behalf of:**	**Licensing Jurisdiction:**	**Size**	**Mass**
Deployer (x2)[15]	ISI Launch (Netherlands)	N/A	12U	7.6kg
Deployer[16]	FOSSA Systems	Spain	N/A	6.8kg
NPS SMPOD-03 Deployer	New Production Concept S.r.l. ("NPC")	Italy	N/A	1.65kg

Table 2: VR-2 Non-Deployable Payloads

All Payloads are commercial customers. Furthermore, each customer is contractually obligated to obtain all necessary authorizations for operation of its spacecraft prior to integration with VR-2 and the launch vehicle. Momentus will confirm each authorization, both as part of its contractual arrangements with its customers and as part of its contractual commitments to the

---

[9] The OreSat0 payload does not have onboard propulsion.
[10] The QMR-KWT payload does not have onboard propulsion.
[11] The Gossamer payload does not have onboard propulsion.
[12] The Revela payload does not have onboard propulsion and is planned to be deployed at the 550km second primary orbit.
[13] The FEES-2 payload does not have onboard propulsion.
[14] The Bhaarathiya-Sat payload does not have onboard propulsion.
[15] This 12U ISIS deployer is a Momentus asset used to launch Momentus customers.
[16] The VR-2 will host two (2) FOSSA Systems "Pocket Pods". Each Pocket Pod is 1.4kg unloaded and is expected to carry 2.0 kg in PocketQube satellites. The 6.8kg total mass is the combination of two (2) 1.4kg deployer and two (2) 2.0kg payload sets. FOSSA is responsible for the licensure and other authorizations necessary to deploy their customer payloads.

launch service provider. If necessary, and in order to meet the VR-2 launch schedule, Momentus may replace a customer spacecraft with a mass dummy. Any such mass dummies would simulate the mechanical interfaces and mass of the customer spacecraft and allow Momentus to conduct a technology demonstration. Momentus, however, would not deploy the mass dummy in orbit. The ability to replace any customer satellite with a mass dummy is key to the ongoing certification of the VR-2 mass properties to the launch service provider. For the avoidance of doubt, should a representative mass be substituted for a customer payload, that representative mass would not be deployed on orbit.

The spacecraft is propelled primarily by a flight proven microwave electrothermal thruster ("MET"), which uses non-toxic and low-pressurized water propellant to provide orbit transfers. Prior to the launch of the VR-2, Momentus MET technology will be flown and demonstrated on the Momentus VR-2 mission, launching in December 2020. Momentus' innovative technology and propulsion system also recently won a NASA iTech award.[17] Additionally, Momentus successfully completed a Phase I SBIR contract in collaboration with the United States Air Force (AFWERX) and Air Force Research Lab (AFRL) to accelerate innovations for in-space transportation services and satellite upper stage technologies and continues to support USG space needs via an open launch contract in support of the NASA Time-Resolved Observations of Precipitation Intensity with a Constellation of Smallsats ("TROPICS") program.

The VR-2 Mission Operations Center ("MOC") is located at the company headquarters in Santa Clara, California. All primary telemetry and commanding will be handled through this

---

[17] *See NASA iTech Winners Impress with Tech Ideas for use in Space, on Earth*, NASA, https://go.nasa.gov/365KB8N (last edited Jul. 16, 2019).

facility, via commercial ground stations, using packetized end-to-end AES256 encrypted links. Additional information on the Ground Segment is in section B.4. below.

VR-2 has a planned launch on a Falcon-9 rideshare in February 2021. VR-2 will be affixed directly to the Falcon-9 via a Planetary Systems MKII Motorized Light Band and deployed into a targeted 454 km (±10 km) circular sun-synchronous orbit with approximately a ~97.4 degree inclination.[18] After separation from the launch vehicle, VR-2 will undergo commissioning and, upon completion, will perform a series of payload deployments and orbit adjustment maneuvers. Throughout its mission, the VR-2 will conduct orbit-raising maneuvers to a series of targeted maximum altitudes. As outlined below, the VR-2 will sequentially target a 580 km circular sun-synchronous orbit with a ~97.1 degree inclination and a 1,000 km apogee by 250 km perigee elliptical orbit which will subsequently be lowered to a 150 km perigee just prior to demise. *See* Table 3 below (summarizing the relevant orbital parameters for the Payloads and VR-2).

As an integral part of the orbit raising concept of operations, Momentus will calculate and monitor propellant consumption and reserve a sufficient amount of propellant to ensure that VR-2 will be capable of conducting a final de-orbit maneuver and retain a substantial propellant reserve, as discussed below. As demonstrated in the attached Orbital Debris Assessment Report ("ODAR"), a 580 km circular sun-synchronous orbit would be the worst-case scenario in the assessment of orbital debris risk, and VR-2 would re-enter the Earth's atmosphere in approximately 15 years at that altitude. Following demonstration of the orbit adjustment capabilities of the spacecraft, VR-2 will engage in de-orbit maneuvers to lower the perigee of the

---

[18] For the purposes of this application, Momentus assumed a 464 km maximum insertion orbit. In the event of the launch vehicle operator selecting an alternative insertion orbit, Momentus will notify the FCC.

spacecraft to a target of 150 km altitude. Momentus will intentionally reserve propellant so that there will be sufficient propellant remaining at end of mission to both execute the de-orbit maneuvers necessary to achieve the targeted 150 km perigee and perform contingency operations in case of potential conjunction. At a 1,000 (maximum) x 150 km orbit, Momentus calculates that VR-2 will de-orbit within approximately 2 months. Naturally, if VR-2 does not reach a 580 km circular orbit, which represents the worst-case scenario, the VR-2 de-orbit period will be compressed further following completion of the de-orbit maneuver.

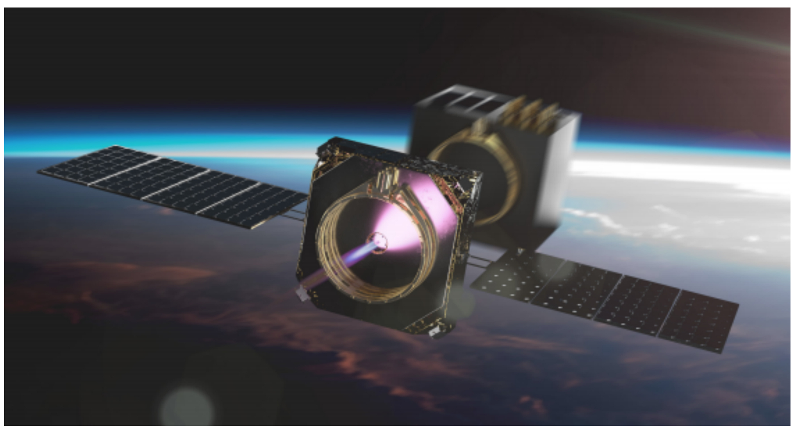

Figure 1: Artist's rendering of a Vigoride spacecraft deploying a customer payload

B. Technical Specifications

1. Orbital Parameters

The VR-2 concept of operations is as follows:

1. Launch vehicle arrives at initial orbit: maximum 464 km circular sun-synchronous orbit with approximately a ~97.4 degree inclination[19]
2. VR-2 separates from launch vehicle

---

[19] SpaceX reports a planned injection orbit of 454 km (± 10 km).

3. VR-2 undergoes commissioning and preliminary testing
4. VR-2 deploys all payloads except DODONA and REVELA[20]
5. VR-2 conducts orbit raising maneuvers to 550 km circular second primary orbit[21]
6. VR-2 deploys the REVELA and DODONA Payloads
7. VR-2 performs detailed system functional testing
8. VR-2 conducts inclination change maneuvers to lower inclination by 0.3 degrees.
9. VR-2 conducts apogee change maneuvers to raise apogee to 580 km
10. VR-2 conducts perigee change maneuvers to raise perigee to 580 km circular third primary orbit
11. VR-2 conducts maneuvers to reduce RAAN by -1 degrees.
12. VR-2 conducts maneuvers to return VR-2 to 550 km SSO second primary orbit
13. VR-2 conducts perigee change maneuvers to lower perigee to 250 km
14. VR-2 conducts apogee change maneuvers to raise apogee to 1,000 km fourth primary orbit
15. VR-2 conducts de-orbit maneuvers (targeting 150 km perigee)

---

[20] All VR-2 payload deployments will be performed in a cadence designed to limit potential immediate collision or subsequent re-conjunction during initial orbits.
[21] The second primary orbit is indicated as a maximum 550 km circular sun-synchronous orbit, based on a planned 86 km raise from a notional maximum 464 km initial orbit)

	VR-2 Insertion Orbit[22]	Second Primary VR-2 Orbit	Third Primary VR-2 Orbit	Fourth Primary VR-2 Orbit	VR-2 End-of-Life Orbit
Apogee Altitude	464 km (max)	550 km (max)	580 km (max)	1,000 km (max)	1,000 km (max)
Perigee Altitude	464 km (max)	550 km (max)	580 km (max)	250 km	150 km[23]
Inclination	~97.4° (Sun-Synchronous)	~97.4° (Sun-Synchronous)	~97.1° (Sun-Synchronous)	~97.4° (Elliptical)	~97.4° (Elliptical)
Period	95 mins	96 mins	96 mins	105 mins	105 mins
Argument of Perigee	N/A	N/A	N/A	N/A	N/A
Local Time of the Ascending Node (LTAN)	~22:15	~22:15	~22:15	~22:15[24]	~22:15
Maximum De-Orbit Life	VR-2[25] ~2.5 years	VR-2[26] ~11 years	VR-2[27] ~15 years	VR-2 ~1 year	VR-2 ~2 months

Table 3: Orbital Parameters

2. Frequency Bands

VR-2 will operate in the S-band (2025-2110 MHz) for Space Operations (Earth-to-space) and in the X-band (8025-8400 MHz) for Space Operations (space-to-Earth). *See* Table 4 below. The use of those frequencies will be primarily for telemetry, tracking, and command ("TT&C"). However, Momentus will also downlink imagery generated from one or more on-board cameras to confirm successful deployment of the Payloads and perform associated mission assurance

[22] As discussed above, the VR-2 insertion orbit is also the insertion orbit of all customer payloads except the Lockheed Martin Dodona satellite and the ARCA Dynamics REVELA satellite.
[23] The target perigee as a result of de-orbit maneuvers is expected to be 150 km.
[24] As the VR-2 approaches more elliptical orbits, it is estimated that LTAN may vary as a natural byproduct of the orbital adjustment.
[25] This is the de-orbit duration if VR-2 has a propulsion system *and* a solar array deployment failure after deployment from the launch vehicle.
[26] This is the de-orbit duration if VR-2 has a propulsion system failure after raising the orbit to 550 km altitude.
[27] This is the de-orbit duration if VR-2 has a propulsion system failure after raising the orbit to 580 km altitude.

functions.[28] Momentus is aware that there are federal and other operations in these frequency bands and intends to coordinate its proposed operations with affected operators prior to operations.

Criteria	Uplink (Earth-to-space)	Downlink (space-to-Earth)	Notes
Center Frequency	2075.0 MHz[29]	8200 MHz	
Bandwidth	0.1 MHz	1 MHz	
Data Rate	50 kbps	500 kbps	Data rate is configurable from approximately 1 kbps up to a maximum listed
Modulation & Coding	BPSK	OQPSK	Links may include FEC.
Transmit Power	9W	3W	
Transmit Antenna	4.5m (dish)	Patch (6 dBiC)	
Transmit Antenna EIRP	43 dBW	6.16 dBW	
Receive Antenna	Patch (7 dBiC)	Dish (48 dBiC)	
Receive Antenna G/T	-23 dB/K	25 dB/K	

Table 4: Radio Frequency Plan

---

[28] Momentus is aware of the potential requirement to obtain a commercial remote sensing license from the National Oceanic and Atmospheric Administration ("NOAA") for the operations of imaging sensors and is engaged in ongoing interchange with NOAA in regards to the recently changed licensing requirements. Regardless, Momentus intends to comply with all necessary NOAA regulatory requirements. *See* 15 C.F.R. Part 960.

[29] Both the identified center frequencies are representative frequency channels. As a result of coordination with federal operators, Momentus may select another channel within the identified frequency bands for its operations.

3. Frequency Tolerance and Emission Limitations

Momentus will comply with the frequency tolerance requirements of 47 C.F.R. § 25.202(e) and the emission limitations of 47 C.F.R. § 25.202(f). In addition, VR-2's transmitter does not turn on automatically, and manual commands from the ground are required to initiate communications from the spacecraft. Accordingly, VR-2 complies with 47 C.F.R. § 25.207.

4. Ground Stations

For the VR-2 mission, Momentus intends to utilize RBC Signals, LLC ("RBC") as the ground segment provider. RBC currently operates a complex network that aggregates capacity of existing satellite ground stations around the world.[30] All operational communications between the Momentus MOC and RBC will be protected by levels of encryption appropriate to secure control over the VR-2. To that end, TT&C transmissions will be sent using packetized protocols incorporating end-to-end AES256 encryption.[31] Table 5 below identifies the ground station from which RBC will communicate with the VR-2.[32]

Location	**Latitude °**	**Longitude °**	**Status**
Deadhorse, Alaska	70.21 N	148.41 W	Operational
Puertollano, Spain	38.67 N	4.16 W	Operational
Jeju Island, South Korea	35.54 N	126.81 E	Operational

Table 5: RBC Ground Stations Supporting VR-2

[30] While RBC operates a network of approximately fifty ground stations, for the VR-2 mission, only those three identified in Table 5 are to be used.
[31] RBC will not receive any keys necessary to decrypt or otherwise manipulate any packetized TT&C instructions sent from the MOC to VR-2.
[32] It is expected that Momentus will have as a minimum between four and five passes per day over the above ground stations (i.e., four to five opportunities per day to communicate with VR-2), but may nominally have in excess of nineteen such passes in any given day. Each communication window presents an average of approximately seven minutes contact time.

5. Microwave Electrothermal Thruster

VR-2 uses a radiofrequency generator that emits electromagnetic energy at a maximum theoretical power level of 750 watts to operate the thruster. This generator uses a magnetron to efficiently produce this level of power output, which, in turn, is delivered via a bolted waveguide connection to the thruster chamber. The location of the generator and the application of shielding mitigates the radiation of emissions outside of the thruster. The emission frequency generated by the magnetron is fixed and operates at 5750 MHz +/- 250 MHz. Electromagnetic Interference emission levels from the flight thruster payload will be measured in an anechoic facility to ensure that radiated levels do not exceed an RF power level of greater than -40 dBm within 1 meter from VR-2 and that all emissions are contained within a bandwidth of no more than 15 MHz.

Momentus' proposed thruster operations will not cause harmful radiofrequency interference to incumbent services. The narrow frequency range around 5750 MHz is used on a primary basis by Radiolocation and Fixed-Satellite (Earth-to-space) and is used on a secondary basis by the Amateur and Amateur-Satellite radio services in all three International Telecommunication Union ("ITU") regions.[33] The power flux density at the Earth's surface from 150 km, the estimated closest operational distance to the satellite, is far below the PFD threshold specified in the ITU Radio Regulations.[34] At the calculated emission levels, no emissions will be detectable (by a very large margin) by radar, mobile, fixed, or amateur

[33] *See* 47 C.F.R. § 2.106.
[34] *See* ITU Radio Regulations 21.16.

systems. All other emissions from the thruster (*e.g.*, harmonics and sub-harmonics) will be further attenuated by at least an additional 20 dB.[35]

III. Waiver Requests

The Commission may waive any of its rules if there is "good cause" to do so.[36] In general, 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.[37] Generally, the Commission will grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.[38] Here, the development of efficient, flexible and non-toxic space transportation infrastructure, and the benefits such a service provide – including, critically, the potential to assist in orbital debris risk mitigation – represent a special circumstance warranting waiver of the FCC rules.

A. U.S. Table of Frequency Allocations

1. 2025-2110 MHz TT&C Uplink

This band is allocated to Space Operations and Earth-Exploration Satellites Services ("EESS"), *inter alia*, in all ITU regions. In the United States, Space Operations are limited to federal operators, and EESS use by commercial operators is subject to conditions as may be

---

[35] Due to the operation of the equipment as part of the spacecraft, Momentus believes the VR-2 thruster should not be characterized as Industrial, Scientific or Medical equipment. *See* 47 C.F.R. §18.101, *et. seq*. In any event, as discussed above, due to the low calculated emissions levels, the frequency range within which the thruster will operate, and the operations of the equipment in space, the emissions from the propulsion system are unlikely to cause harmful interference to any authorized services.

[36] *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).

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

[38] *See WAIT Radio*, 418 F.2d at 1157.

applied on a case-by-case basis and the limitation that any use may not cause harmful interference to authorized operations.[39] Accordingly, to the extent necessary, Momentus requests waiver of the Table of Allocations to use the 2025-2110 MHz band (Earth-to-space) for TT&C. Given the limited use of the frequencies during the brief 180-day mission, Momentus' commitment to coordinate use of these frequencies, and the public interest justification supporting the mission, Momentus submits that waiver is warranted.

2. 8000-8400 MHz TT&C Downlink

The 8025-8400 MHz band is, as discussed above, to be used primarily for TT&C.[40] Given the limited use of the frequencies during the brief 180-day mission, Momentus' commitment to coordinate use of these frequencies, and the public interest justification supporting the mission, Momentus submits that waiver is warranted.

B. 47 C.F.R. § 25.113(g)

The Commission's rules require orbital deployment approval and operating authority to be applied for and granted prior to orbital deployment and operation of a space station. In this case, given (1) the short operational life of the VR-2 spacecraft; (2) the similarity in function of VR-2 to an upper stage launch vehicle; (3) the information contained in this application regarding spacecraft operations and debris mitigation plans; and (4) the public interest justification supporting the mission, Momentus believes the underlying purposes of the rule (to provide sufficient information for the FCC to evaluate the satellite mission) is met and that grant

---

[39] *See* 47 C.F.R. § 2.106 n. US347.
[40] Such use will also include transmission of limited imagery of the Payloads during deployment primarily to provide mission assurance and, to a limited degree, selected images for publicity or marketing purposes.

of the requested waiver is justified.[41] Further, the FCC has granted similar applications for in-space transportation spacecraft in the recent past.[42]

IV. ITU Compliance

Momentus has prepared the ITU Advance Publication Information submission for its proposed system and is contemporaneously providing this information to the FCC under separate cover. Attached as an exhibit to this application is a signed ITU cost recovery letter.

Respectfully submitted,

/s/ Philip Hover-Smoot

Philip Hover-Smoot
Associate General Counsel
Chief Ethics & Compliance Officer
Momentus Inc.
3050 Kenneth Street
Santa Clara, CA 95054
+1-415-254-1295

Dated: August 31, 2020

---

[41] Consistent with FCC precedent, *see infra* note 42, Momentus believes that submission of the Schedule S form is not necessary for processing of this application for special temporary authority. Regardless, a completed Schedule S has been submitted electronically in order to provide as much technical context as possible.

[42] *See* Application of Spaceflight, IBFS File No. SAT-STA-20180523-00042 (granted Oct. 12, 2018); Application of Spaceflight, IBFS File No. SAT-STA-20150821-00060 (granted Oct. 26, 2016).

EXHIBIT 1

ITU Cost Recovery Letter

EXHIBIT 2

Momentus Ownership Exhibit

MOMENTUS INC. OWNERSHIP INFORMATION

Momentus Inc. is a privately held corporation. Listed below are the entities that have a 10% or greater interest in Momentus Inc.:

1. **Mikhail Kokorich directly and/or indirectly**
   c/o Momentus Inc.

   3050 Kenneth Street

   Santa Clara, CA 95054

   Ownership Interest: 19.37%

   Voting Interest: 46.87%

   Nationality: U.S. asylum seeker; formerly Russia

2. **Olga Khasis directly and/or indirectly**
   16047 Collins Avenue, Unit 1603

   Sunny Isles Beach, Florida 33160

   Ownership Interest: 16.98%

   Voting Interest: 36.41%

   Nationality: U.S.

3. **Dakin Sloss**
   General Partner, Prime Movers Lab ("PML")

   PO Box 12829

   Jackson, WY 83002

   PML Ownership Interest: 29.14%

   PML Voting Interest: 9.9%

Nationality: U.S.

OFFICERS AND DIRECTORS

All of the directors and officers of Momentus may be reached at the following address:

c/o Momentus Inc.
3050 Kenneth Street
Santa Clara, CA 95054

1. Mikhail Kokorich
   President & Chief Execution Officer, Director

2. Dakin Sloss
   Director, Chairman

3. Vince Deno
   Director

4. Alexander Fishkin
   Chief Business Affairs & Legal Officer, General Counsel, Secretary

5. Philip Hover-Smoot
   Associate General Counsel, Chief Ethics & Compliance Officer

6. Dana Waldman
   Chief Operating Officer

7. Rob Schwarz
   Chief Technology Officer

8. Temitope Celestina Oduozor
   Vice President, Controller

9. Dawn Ann Harms
   Chief Revenue Officer

10. Alexander Wicks
    Chief Development Officer

DECLARATION

I, Philip Hover-Smoot, hereby declare the following:

Momentus Inc. ("Momentus") is aware that as a result of actions taken at the International Telecommunication Union's 1998 Plenipotentiary Conference, and further modified by the ITU Council in subsequent years, processing fees will now be charged by the ITU for satellite network filings. As a consequence, Commission applicants are responsible for any and all fees charged by the ITU. Momentus hereby states that it is aware of this requirement and unconditionally accepts all cost recovery responsibilities associated with the ITU filings for the Vigoride-2 or VR-2 satellite network. Please address all correspondence related to the Vigoride-2 satellite network to the following point of contact:

Point of Contact Name: Philip Hover-Smoot

Organization Name: Momentus Inc.

Address: 3050 Kenneth Street
Santa Clara, CA 95054

E-Mail: philip.hover-smoot@momentus.space

Telephone Number: +1-415-254-1295

Sincerely,

/s/ Philip Hover-Smoot

Philip Hover-Smoot
Associate General Counsel
Chief Ethics & Compliance Officer
Momentus Inc.

August 31, 2020