Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
BASALT TECHNOLOGIES CORP.	)	File Number: SAT-LOA-2025_____
	)	
Application for Authority to Launch and Operate the Spirit-EEL Non-Geostationary Orbit System in the Earth Exploration-Satellite Service, Space Operation Service, and Mobile Satellite Service	)	Call Sign: _____

APPLICATION

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APPLICATION

Basalt Technologies Corp. ("Basalt")[1] requests authority to launch and operate a three-3U cubesat non-geostationary orbit ("NGSO") system, named "Spirit-EEL,"[2] under the streamlined small satellite licensing process.[3] During this mission, Basalt would demonstrate the use of artificial intelligence ("AI") agent and multi-agent systems to effectively manage and control Earth imaging spacecraft in orbit. The targeted US federal coordination response date is May 7, 2025, and the requested license issue date is August 1, 2025.

I. MISSION AND PUBLIC INTEREST

The race is on to deploy and manage large satellite constellations. But the related operational complexity has increased exponentially and created an urgent need for robust, efficient, and scalable systems to operate satellites. Basalt is the first and only company to provide a comprehensive software system to tackle the most persistent challenge facing modern satellite fleets: continuous, high-precision management without labor-intensive staffing. By reducing

[1] Basalt is a San Francisco, CA-based company incorporated in Delaware.

[2] The satellites are BSLT-1, BSLT-2, and BSLT-3.

[3] *See* 47 C.F.R. § 25.122; *see also Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019) ("*Smallsat R&O*").

human error and providing seamless software-driven coordination, Basalt's solution not only reduces costs but also increases commercial space asset performance. It system would enable operators to implement real-time adjustments for constellation optimization, resource allocation, and payload scheduling with minimal human intervention. It would reduce operating costs by a factor of 10 and enable space companies to achieve stronger space investment returns.

Given these developments and opportunities, the planned Spirit-EEL mission would advance US-based space technology and innovation.

The Spirit-EEL mission would include three 3U cubesats providing training data streams to finetune Basalt's software and demonstrate its reliability. The satellites would –

- leverage AI agent and multi-agent systems to effectively manage and control unpropelled Earth imaging spacecraft in orbit with high service uptime and minimal human intervention.[4]
- "roleplay" as a commercial imaging service constellation and manage changing data, thermal, and power needs of the camera while keeping the spacecraft bus alive using using Basalt's algorithms.
- schedule time to downlink Earth imagery.

The telemetry data stream would support Basalt AI system training while the downlinked imagery of the Earth's surface would support commercial marketing and demonstration purposes.

[4] Agent AI "leverages large language modes [('LLMs')] as the brain, or the orchestrator, integrating them with external tools and agenda such as planning, enabling LLM-based agents to take actions [and] solve complex problems." Khanh-Tung Tran et al., *Multi-Agent Collaboration Mechanisms: A Survey of LLMs*, arXiv at 1 (2025). These multi-agent systems "enable groups of intelligent [AI] agents to coordinate and solve complex tasks collectively at scale, transitioning from isolated models to collaboration-centric approaches. . . . [They] enhance long-term planning by delegating tasks across agents, supporting persistent problem-solving [and] allowing them to address diverse problems more effectively than standalone models." *Id.* at 1, 2.

II. SYSTEM DESCRIPTION

Attachment A (Technical Annex) and Attachment B (Coordination Spreadsheet) capture the orbital, Earth station, and radiofrequency parameters. Spirit-EEL would operate in the Earth exploration-satellite service ("EESS"), space operation service ("SOS"), and mobile-satellite service ("MSS").

EESS. The EESS is a "is a radiocommunication service between earth stations and one or more [satellites in which] information relating to the characteristics of the Earth and its natural phenomena, including data relating to the state of the environment, is obtained" onboard satellites and retransmitted to the ground.[5] Basalt would image the Earth. As a result, Basalt's operations would qualify as EESS.

SOS. The SOS concerns "exclusively with the operation of spacecraft, in particular space tracking, space telemetry and space telecommand."[6] Basalt would command and receive telemetry from the satellites to ensure safe space operations and deorbit. As a result, Basalt's operations would qualify as SOS.

MSS. The MSS is a "radiocommunication service . . . between mobile earth stations and one or more space stations" and "may also include feeder links" that are radio links "from an earth station at a given location to a space station, or vice versa, conveying information for a space radiocommunication service other than for the fixed-satellite service. The given location may be at a specified fixed point, or at any fixed point within specified areas."[7] Basalt would have fixed

[5] ITU RR Nos. 1.51, 1.182.

[6] *Id.* No. 1.23.

[7] *Id.* Nos. 1.25, 1.115.

feeder link Earth stations transmitting SOS data. As a result, Basalt's operations would qualify as MSS.

Table 1 shows the frequency plan, including the associated service classification and allocation status.

Table 1: Frequency Plan[8]

Beam ID	Targeted Frequency (MHz)[9]	Link Direction and Service Area	Description	Service	Int'l Allocation?	US Allocation?[10]
qUR1	399.9-400.05	Earth-to-space (global)	service (backup) TT&C (backup)	MSS	Yes	Yes
UT1	401-402	space-to-Earth (global)	service (backup)	SOS	Yes	Yes
SR1	2025-2110	Earth-to-space (global)	service (primary) TT&C (primary)	EESS SOS	Yes	Yes (EESS) No (SOS)
ST1	2200-2290	space-to-Earth (outside US only)	service (primary) TT&C (primary)	EESS SOS	Yes	N/A

[8] Each satellite would receive the 1575.42 MHz (Global Positioning System L1) radionavigation-satellite service signal without modification for on-orbit positioning determination. *See, e.g., HawkEye 360, Inc.*, Order, 39 FCC Rcd 2393 (2024).

[9] Final frequency selection will depend on coordination results.

[10] *See* Narrative § IV and Attachment A § IV.A for the waiver request (to the extent necessary) and justifications to use the 399.9-400.05 MHz and 2025-2110 MHz bands as a non-conforming service on a non-interference, non-protected basis.

III. SMALL SATELLITE CERTIFICATIONS

Basalt certifies that the mission meets the following streamlined small satellite processing criteria. See Table 2 for further details.

Table 2: Streamlined Smallsat Compliance

Streamlined Requirement	Compliance
(1) The space station(s) will operate only in non-geostationary orbit.	The satellites will deploy and operate in NGSO at 510 ± 20 km.[11]
(2) The total in-orbit lifetime for any individual space station will be six years or less.	The satellites will fully demise within six years of deployment. See Orbital Debris Assessment Report.
(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.	The satellites will deploy below 600 km.
(4) Each space station will be identifiable by a unique signal-based telemetry marker distinguishing it from other space stations or space objects.	The satellites will have a unique transmitting telemetry channel to allow them to be identifiable during commissioning and in-orbit activities.
(5) The space station(s) will release no operational debris.	The satellites 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.	Basalt has assessed and limited the probability of accidental explosions, including those resulting from the conversion of energy sources on board the satellites into energy that fragments the spacecraft.
(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	The collision probability between each satellite and other large objects is less than 0.001 at its worst-case operational altitude. See Orbital Debris Mitigation Plan.

[11] Because SpaceX's missions include multiple payloads, discretion over the final deployment parameters remains SpaceX's exclusive prerogative.

Streamlined Requirement	Compliance
or less as calculated using current NASA software or other higher fidelity model.	
(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.	The satellites will reenter the Earth's atmosphere after mission completion and have zero spacecraft portions surviving reentry. See Orbital Debris Mitigation Plan.
(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).	The operations will be compatible with existing operations in the authorized frequency bands and will not materially constrain future space station entrants from using the authorized frequency bands. See Attachment A (Technical Annex).
(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.	Basalt can immediately cease transmissions using ground-originating commands. Basalt will have the capability to eliminate harmful interference when required under its license terms or other applicable regulations.
(11) Each space station is 10 cm or larger in its smallest dimension	Each satellite's smallest dimension exceeds 10 cm. See Orbital Debris Mitigation Plan.
(12) Each space station will have a mass of 180 kg or less, including any propellant.	Each satellite will weigh less than 180 kg. See Orbital Debris Mitigation Plan.

Small satellites operating under the streamlined rules are exempt from the Part 25 processing round and default service requirements.[12] Such satellites are "designed to serve [their] purpose within a limited, relatively short period of time [and] have more limited frequency use characteristics than more traditional operations licensed under Part 25."[13] In the absence of

[12] *See Smallsat R&O* ¶ 80.

[13] *Id.*

processing round rules, an applicant must "(a) certify that operations of its satellites will not interfere with those of existing operators, (b) certify that it will not materially constrain future operators from using the assigned frequency band(s), and (c) provide a brief narrative description illustrating the methods by which both current and future operators will not be materially constrained."[14]

Basalt certifies that its satellite operations will not interfere with existing parties operating consistent with the frequency allocation table and will not materially constrain future operators from using the assigned frequency bands. Attachment A (Technical Annex) further explains Spirit-EEL's spectrum sharing capabilities.

IV. WAIVER REQUESTS

The Commission may waive any of its rules for "good cause."[15] Waiver is appropriate when (i) special circumstances warrant a deviation from the general rule; and (ii) such deviation will serve the public interest better than strict adherence to the rule.[16] In general, the Commission will grant a waiver of its rules if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.[17] Additionally, the Commission generally grants a waiver of the frequency allocation table "when there is little potential for interference into any service authorized under the [table] and when the non-conforming operator accepts any interference from authorized services."[18]

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[14] *Id.* ¶ 81.

[15] *See* 47 C.F.R. § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990); *see also WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969).

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

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

[18] *The Boeing Company Application for Blanket Authority to Operate Up to Eight Hundred Technically Identical Transmit and Receive Mobile Earth Stations Aboard Aircraft in the 14.0-*

A. 47 C.F.R. §§ 2.102(a) (Frequency Assignments) and 2.106 (International and US Non-Federal Frequency Allocation Tables)

Good cause exists to waive 47 C.F.R. §§ 2.102(a) (frequency assignments) and 2.106 (international and US non-federal frequency allocation tables) to the extent necessary to consider and grant the application. The 399.9-400.05 MHz band is allocated for non-federal MSS (Earth-to-space), including SOS feeder links, while the 2025-2110 MHz band is allocated for non-federal EESS (Earth-to-space), including telecommand, but not SOS. Erring cautiously, Basalt seeks a waiver to the extent necessary for its proposed operations in both bands. As mentioned above, these bands would support satellite/payload telecommand. This operation involves minimal potential for interference into any authorized service in this band (see Attachment A (Technical Annex)). In brief, Basalt anticipates that successful coordination in this band is achievable because the satellites would only communicate when in view of an authorized earth station and use small bandwidths, limited duty cycles, frequency agile software-defined radios, scheduled ground transmissions, and interference-mitigation techniques, including conjunction-avoidance angles. As a result, this mission would not interfere with authorized co-frequency services. Further, Basalt affirms that it will accept any interference from authorized services operating in conformance with the frequency allocation table.

Good cause exists for the requested waiver. The proposed non-conforming operations would benefit the public by counseling the development of new space-based AI capabilities as described in Section I.

14.5 GHz and 11.7-12.2 GHz Frequency Bands, Order and Authorization, 16 FCC Rcd 22645 ¶ 12 (IB & OET 2001) (internal punctuation omitted). *See generally Application of Fugro-Chance, Inc. for Blanket Authority to Construct and Operate a Private Network of Receive-Only Mobile Earth Stations*, Order and Authorization, 10 FCC Rcd 2860 (IB 1995); *Application of Motorola Satellite Communications, Inc. for Modification of License*, Order and Authorization, 11 FCC Rcd 13952 (IB 1996).

B. 47 C.F.R. § 25.112 (Schedule S)

A Schedule S form accompanies this application.[19] Basalt cannot accurately describe the proposed operations given Schedule S limitations and, therefore, requests waiver of the Schedule S to the extent necessary.

Estimated lifetime. Spirit-EEL has an estimated lifetime of 5.57 years, not 6 years as listed in the Schedule S (which does not permit decimal values).

Orbital plane 1. Spirit-EEL has an orbital altitude and inclination range. Basalt lists the nominal values in Schedule S and specifies these values in Attachment B (Coordination Spreadsheet). Further, Spirit-EEL has no right ascension of ascending node, argument of perigee, and mean anomaly at the orbit epoch date values currently because Basalt is a secondary rideshare customer with no control and visibility over its orbital deployment parameters. As a result, these Schedule S fields state 0 deg.

All beams – antenna pointing and rotational errors. The antenna pointing and antenna rotational errors are inapplicable. Basalt cannot capture this inapplicability in Schedule S and has entered "0" for these values.

All receiving beams – saturation flux-density. The saturation flux-density concept does not technically apply to Spirit-EEL because it processes signals prior to retransmission (unlike many legacy bent-pipe systems). Basalt cannot capture this inapplicability in Schedule S and has entered "0" and "-0.1" for the maximum and minimum values.

All transmitting beams – maximum PFD. The power flux-density ("PFD") calculations are at 500 km, not the lowest operational orbit at 400 km. For bands subject to PFD limits, Basalt

[19] *See* 47 C.F.R. § 24.114(c).

would reduce power as its altitude decreases and demonstrates in Attachment A (Technical Annex) that the reduced power at the lowest operational orbit satisfies the applicable power restrictions.

Receiving beam UR1 and transmitting beam UT1 – polarization. The polarization is mixed horizontal and vertical, not only horizontal as listed in Schedule S.

Transmitting beam ST1 – maximum EIRP. The maximum EIRP is -10 dBW, not 10 dBW as listed in Schedule S (which does not allow negative values).

Basalt has provided all relevant information in the application package, so waiving these and any other Schedule S requirements is appropriate.[20]

C. 47 C.F.R. § 25.114 (Application Completeness)

Application dismissal may occur if the submission contains incomplete information or internal inconsistencies.[21] Even in these cases, however, the Commission rules provide that the Commission may accept a defective application if accompanied by an appropriate waiver request.[22] Basalt requests waiver of this rule and asks the Commission to permit Basalt to supplement its application if additional information or explanation is necessary. Granting it would avoid unduly harsh results given no regulatory framework properly captures the proposed operations and would conserve limited FCC resources by allowing any concerns to be addressed on an issue-specific basis.

[20] *See, e.g.*, Viasat, Stamp Grant, SAT-LOI-20140204-00013 (granted Jun. 18, 2014) (waiving Schedule S requirements because they were found to be unnecessary for the space station application).

[21] *See* 47 C.F.R. § 25.112(a).

[22] *See id.* § 25.112(b).

V. OTHER MATTERS

A. ITU Requirements

When issuing launch-and-operational authority, the Commission submits International Telecommunication Union ("ITU") filings.[23] In concert with this application, Basalt will submit the necessary ITU data and unconditionally accepts all associated cost-recovery responsibilities.

B. Ownership Information

Basalt's ownership structure appears in Attachment C.

C. NOAA Licensing

Basalt will ensure it satisfies relevant National Oceanic and Atmospheric Administration licensing obligations.

VI. CONCLUSION

The proposed operations support Basalt's next-generation satellite AI technology. Authorizing the requested satellites would support this necessary initiative and, therefore, would serve the public interest.

[23] *See id.* § 25.111.

Respectfully submitted,

/s/ Maximillian Bhatti

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ATTACHMENT A (TECHNICAL ANNEX)

This attachment offers supplemental technical details regarding the Spirit-EEL mission because the above Narrative and attached Form 312, Schedule S require further clarification.

I. SYSTEM DESCRIPTION

A. Mission Concept

Spirit-EEL includes three 3U cubesats. Attachment B (Coordination Spreadsheet) specifies their orbital, Earth station, and radiofrequency parameters. The initial operations would activate the command, control, and data handling system and begin passive spacecraft stabilization. The next phase would include communication between the onboard transceiver and the Earth stations, including housekeeping telemetry data downlink. If these steps are complete, the satellites would undergo a two-to-four-week guidance commissioning and testing period to ensure proper onboard system functioning. Once all subsystems are properly functioning, the primary mission would begin.

AI performance is verified and subject to human staff override. For all satellite and payload operations, the AI systems would generate commands, but humans must approve such commands before they are sent. If the AI malfunctions, human operations staff would not approve the action, and the AI system cannot appeal the human decision.

Each satellite would host the payloads in Table A-1.

Table A-1: Spirit-EEL Hosted Payloads[1]

Satellite	Payload
BSLT-1	1x OV7670 Visible Light CMOS Camera
BSLT-2	1x Blackfly S Visible Light Camera
	1x Google Coral USB Tensor Processing Unit
BSLT-3	1x Blackfly S Visible Light Camera
	2x Google Coral USB Tensor Processing Unit

The main data product would be the spacecraft's housekeeping telemetry data. It would support AI system training and demonstrate the algorithm's effectiveness in managing onboard resources.

[1] None of these payloads would transmit or receive radiofrequency energy.

B. Ground Segment

Attachment B (Coordination Spreadsheet) summarizes the Earth station locations.

II. POWER LIMITS

Spirit-EEL would satisfy the relevant in-band and out-of-band power limits.

A. In-Band Power

No power limits exist for 401-402 MHz (space-to-Earth) and 2025-2110 MHz (Earth-to-space) communications in either the ITU or FCC rules. Basalt would employ the radiofrequency-interference mitigation procedures identified below and, when necessary, coordinate with other authorized operators to avoid harmful interference.

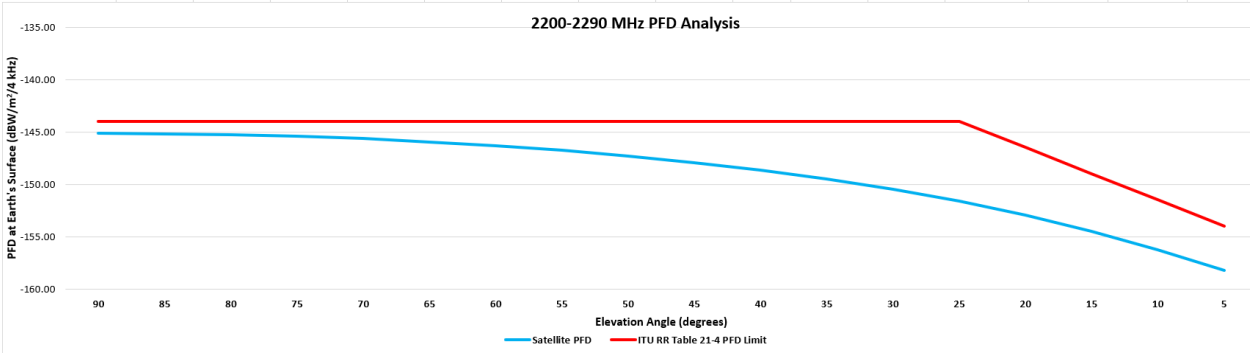
In the 399.9-400.05 MHz (Earth-to-space) band, the FCC rules do not specify a power limit; however, ITU Radio Regulations No. 5.260A imposes a 5 dBW EIRP and 5 dBW/4 kHz EIRP density limit within 399.9-400.02 MHz. Basalt would operate in 400.02-400.05 MHz, where no power limits apply; employ the radiofrequency-interference mitigation procedures identified in the next section; and, when necessary, coordinate with other authorized operators to avoid harmful interference.

In the 2200-2290 MHz (space-to-Earth) band, the FCC rules do not specify a power limit; however, ITU Radio Regulations Table 21-4 imposes PFD limits within the broader 1525-2300 MHz range. According to Table 21-4, space station PFD emissions in this frequency range at the Earth's surface shall not exceed the following values:

- -154 dB(W/m) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- $-154 + 0.5 (\delta - 5)$ dB(W/m) in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and
- -144 dB(W/m) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

Following is a chart illustrating the PFD at the Earth's surface in the 2200-2290 MHz band based on a -12.2 dBW EIRP, 39.2 kHz emission bandwidth, and 400 km minimum operational orbit:

Figure A-1: 2200-2290 MHz PFD Analysis



B. Out-of-Band Power

The US federal agencies require out-of-band-emissions limits compliance to safeguard space research service (deep space) operations adjacent to the 2200-2290 MHz band. Basalt will use a combination of baseband digital filtering and hardware radio frequency filtering to ensure that its out-of-band emissions will not cause interference to authorized services in adjacent frequency bands. Basalt will also submit spectrum roll-off measurements to the US federal agencies, and if such plots are unsatisfactory or Basalt cannot reach agreement based on alternative mitigation measures, it will not transmit when the satellite is visible to such deep space Earth stations.

III. US FEDERAL PROTECTION

Basalt agrees to coordinate with US federal spectrum users to safeguard their operations. Attachment B (Coordination Spreadsheet) includes the parameters necessary for these deliberations.

IV. SPECTRUM SHARING ANALYSIS

In the proposed bands, satellite systems normally communicate only in short periods of time while visible from the dedicated earth stations or satellites (typically less than 10 minutes for

a single pass).[2] For interference to occur, (i) either another operator's satellite would have to travel through the antenna beam of Basalt's serving earth station or the Basalt satellite would have to pass through the antenna beam of the other operator's serving earth station, and (ii) both systems would need to transmit at the same time on overlapping frequencies. In such an unlikely circumstance, Basalt can mitigate interference by coordinating the communications with other operators in the same frequency bands to prevent simultaneous transmission. Other parties have historically coordinated the requested frequencies without issue before commencing operations, and Basalt commits to undertaking similar coordination for the instant system. Basalt anticipates that successful coordination in these bands is achievable because the Basalt satellites would only communicate when in view of an authorized earth station using small bandwidths, limited duty cycle, frequency agile software-defined radios, scheduled ground transmissions, and interference-mitigation techniques, including conjunction-avoidance angles.

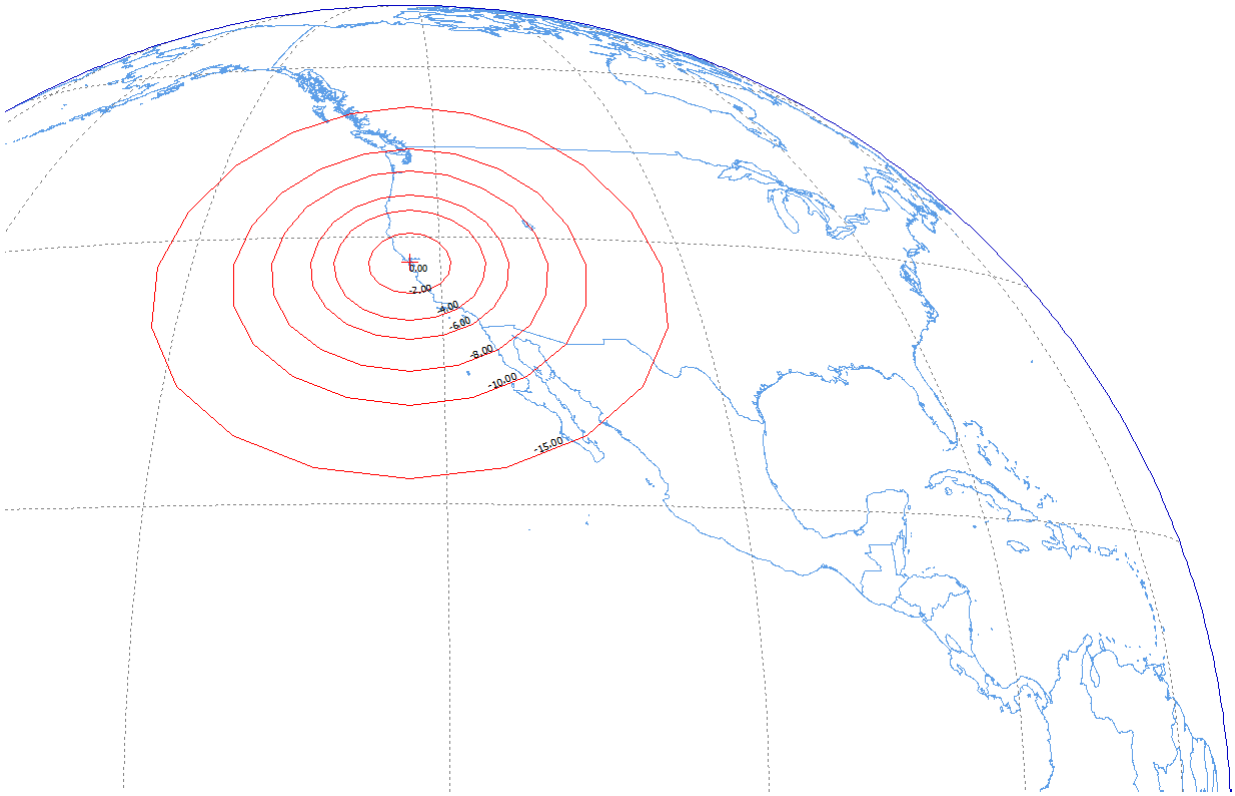
V. REPRESENTATIVE ANTENNA GAIN CONTOUR PLOTS

This section includes representative antenna gain contour plots. Note that values where the gain contour does not intersect the Earth are not shown in the following figures.

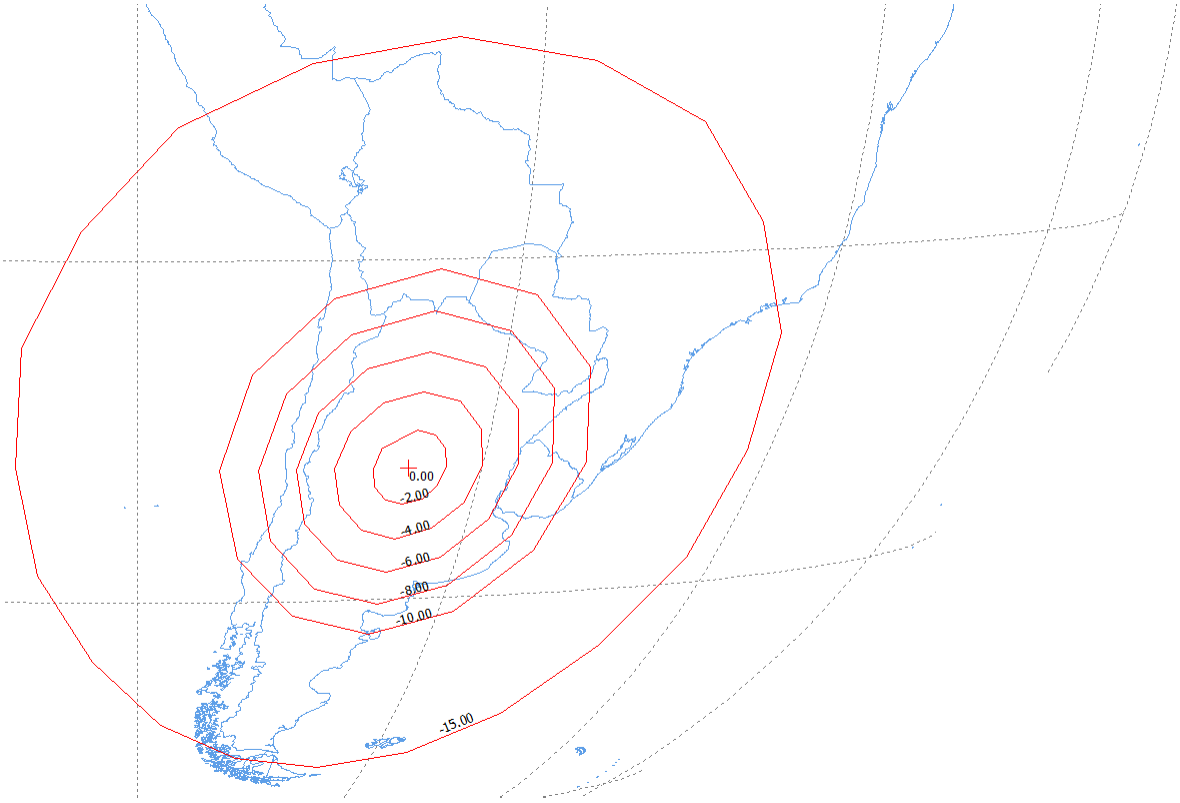
[2] Each satellite would have a UHF (space-to-Earth) beacon with an automatic cessation mechanism that would support only the mission's commissioning phase (first 3 days). The beacon's concept of operations are the following: (1) the satellite deploys from the launch vehicle; (2) the flight computer boots, and the beacon setting is off; (3) the beacon is activated by the flight computer; (4) beaconing occurs every 127 seconds; (5) the beacon setting is turned off after contact occurs, or after a flight computer timeout of 2 hours; and (6) if the flight computer is unresponsive or crashes, the satellite reboots the system and the beacon is reset to its default disabled state. The spacecraft's reboot function is triggered by a double redundant watchdog timer in the battery and power systems.

A. Space-to-Earth Bands

i. 401-402 MHz

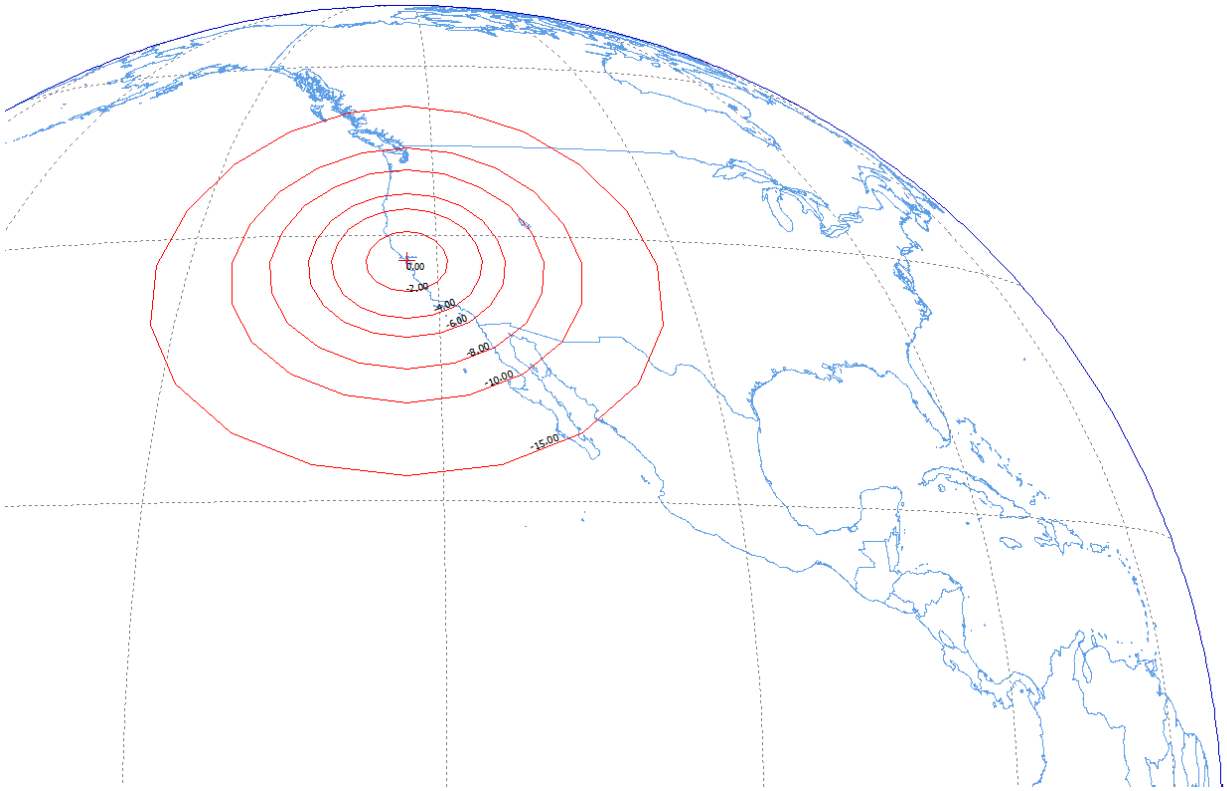


ii. 2200-2290 MHz

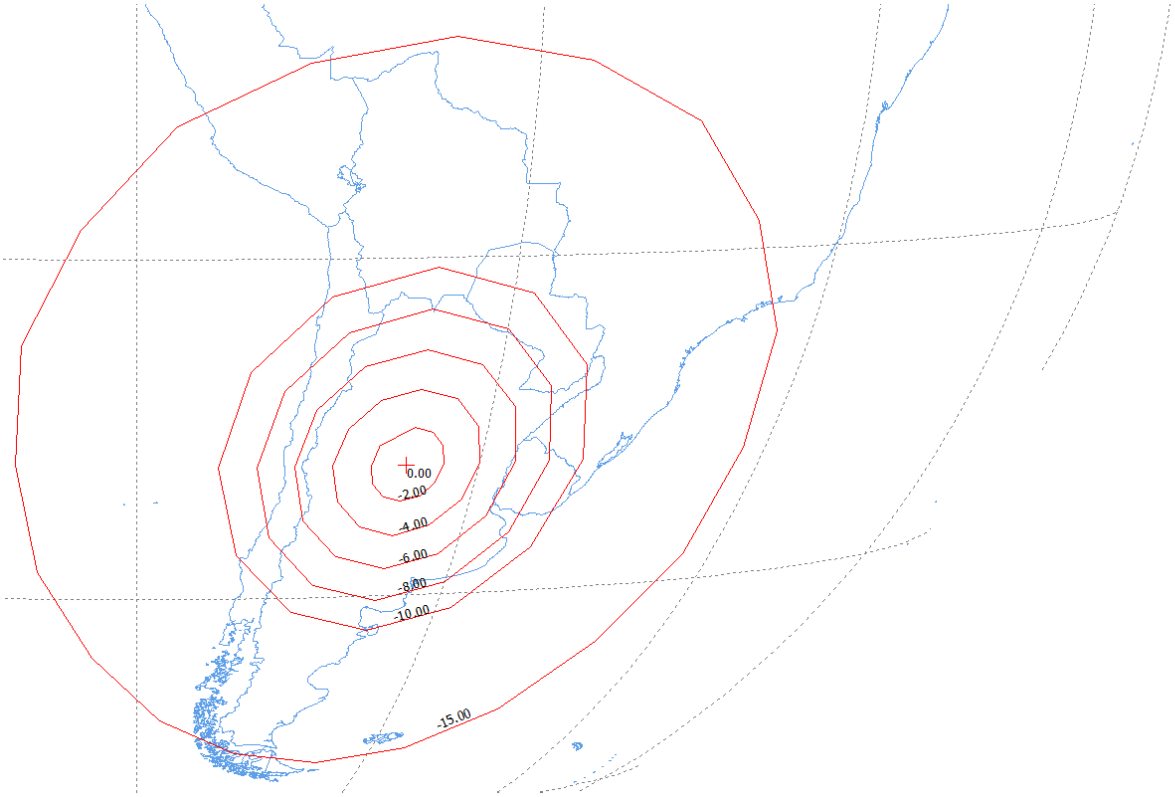


B. Earth-to-Space Bands

i. 399.9-400.05 MHz



ii. 2025-2110 MHz



ENGINEERING CERTIFICATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this application, and that it is complete and accurate to the best of my knowledge and belief.

/s/ Maximillian Bhatti

Maximillian Bhatti

ATTACHMENT B (COORDINATION SPREADSHEET)

Frequency Coordination Template

Constellation Orbit Parameters

Parameters	BSLT-1	BSLT-2	BSLT-3
Deployment Altitude Apogee (km)	510 ± 20	510 ± 20	510 ± 20
Deployment Altitude Perigee (km)	510 ± 20	510 ± 20	510 ± 20
Deployment Inclination (deg)	97.45 ± 1.5	97.45 ± 1.5	97.45 ± 1.5
Service only Operational Altitude Apogee (km)	510 ± 20	510 ± 20	510 ± 20
Service only Operational Altitude Perigee (km)	510 ± 20	510 ± 20	510 ± 20
Service only Operational Inclination (deg)	97.45 ± 1.5	97.45 ± 1.5	97.45 ± 1.5
Sun Sync (Y/N)	Y	Y	Y
LTAN, LTDN, or RAAN	LTDN: 10:00 + 60 minutes	LTDN: 10:00 + 60 minutes	LTDN: 10:00 + 60 minutes
TT&C only End-of-Life Altitude Apogee (km)	400	400	400
TT&C only End-of-Life Altitude Perigee (km)	400	400	400
TT&C only End-of-Life Inclination (deg)	97.45 ± 1.5	97.45 ± 1.5	97.45 ± 1.5
Expected Launch (date)	10/01/2025	10/01/2025	10/01/2025
Expected Lifetime (years)	6	6	6
Expected End of Life (year)	2031	2031	2031

Mission Parameters

Attribute	Value	Comment
Mission Name	Spirit-EEL	N/A
Responsible Company	Basalt Technologies Corp.	N/A
POCs	Sophia Li (sophia@basalt.space) George John (george.john@hoganlovells.com)	N/A

Orbital Parameters (Choose one)

Attribute	Value	Comment	
Altitude Apogee (km)	N/A	see constellation orbit parameters table	NGSO
Altitude Perigee (km)	N/A	see constellation orbit parameters table	
Inclination (degree)	N/A	see constellation orbit parameters table	
Sun Sync (Y/N)	N/A	see constellation orbit parameters table	
LTAN, LTDN, or RAAN	N/A	see constellation orbit parameters table	
Number of Orbital Planes	1	see constellation orbit parameters table	
Spacing between Orbital Planes	N/A	see constellation orbit parameters table	
Spacecraft Spacing within Planes	N/A	The satellites will naturally drift after their rideshare deployment because they do not have manuevering capability.	
Longitude of Orbital Slot (E)	N/A	N/A	GSO
Inclination (degree)	N/A	N/A	
Reference Body	N/A	N/A	non-Geocentric Orbits
Apoapsis (km)	N/A	N/A	
Periapsis (km)	N/A	N/A	
Inclination (degree)	N/A	N/A	

Uplink Parameters

Frequency Band	Center Frequency (MHz)	Bandwidth (MHz)	Polarization Type (optional)	Duty Cycle % (time transmitting/ time visible)
399.9-400.05 (UHF)	400.0375	0.00989	Mixed (H and V)	see earth stations table below
2025-2110 (S-band)	2074.3	0.22	RHCP	see earth stations table below

Downlink Parameters

Frequency Band	Center Frequency (MHz)	Bandwidth (MHz)	Sat Tx Power (dBW) (at the antenna port)	Sat Tx Ant Gain (dBi)	Polarization Type (optional)	Duty Cycle % (time transmitting/ time visible)
401-402 (UHF)	401.2	0.00989	3	0	Mixed (H and V)	see earth stations table below
2200-2290 (S-band)	2268.8	0.0392	-17	7	RHCP	see earth stations table below

Crosslink Parameters

Frequency Band	Center Frequency (MHz)	Bandwidth (MHz)	Sat Tx Power (dbW)	Sat Tx Ant Gain (dBi)	Polarization Type	Receive Satellite	Duty Cycle %	Comments
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Receive Earth Stations

Location Name	Frequency Band	Lat.	Long.	Duty Cycle (time transmitting/ time visible)	Comments
San Francisco, CA, USA	UHF	37°47'22.30"N	122°25'6.82"W	100%	11 minutes transmitting / 11 minutes visible
Dundee, Scotland	S-band	56°24'21.02"N	3°1'21.66"W	36.0%	4 minutes transmitting / 11 minutes visible
Dubai, United Arab Emirates	S-band	24°56'33.72"N	55°21'5.99"E	36.0%	4 minutes transmitting / 11 minutes visible
Awarua, New Zealand	S-band	46°31'44.03"S	168°22'52.51"E	36.0%	4 minutes transmitting / 11 minutes visible
Guildford, United Kingdom	S-band	51°14'31.4"N	000°37'06.4"W	36.0%	4 minutes transmitting / 11 minutes visible
Zallaq, Bahrain	S-band	26°03'05.4"N	50°30'12.4"E	36.0%	4 minutes transmitting / 11 minutes visible
Singapore	S-band	1°22'34.0"N	103°58'10.9"E	36.0%	4 minutes transmitting / 11 minutes visible
Cordoba, Argentina	S-band	31°31'25.3"S	64°27'44.6"W	36.0%	4 minutes transmitting / 11 minutes visible
Dublin, Ireland	S-band	53°24'23.8"N	6°13'27.8"W	36.0%	4 minutes transmitting / 11 minutes visible

Transmit Earth Stations

Location Name	Frequency Band	Lat.	Long.	Transmit Power (dBW) (at the antenna port)	Transmit Gain (dBi)	Duty Cycle (time transmitting/ time visible)	Comments
San Francisco, CA, USA	UHF	37°47'22.30"N	122°25'6.82"W	17	13.0	100%	11 minutes transmitting / 11 minutes visible
San Francisco, CA, USA	S-band	37°47'22.30"N	122°25'6.82"W	12	26.0	100%	11 minutes transmitting / 11 minutes visible
Dundee, Scotland	S-band	56°24'21.02"N	3°1'21.66"W	48	35.4	36.0%	4 minutes transmitting / 11 minutes visible
Dubai, United Arab Emirates	S-band	24°56'33.72"N	55°21'5.99"E	50	34.6	36.0%	4 minutes transmitting / 11 minutes visible
Awarua, New Zealand	S-band	46°31'44.03"S	168°22'52.51"E	49	35.5	36.0%	4 minutes transmitting / 11 minutes visible
Guildford, United Kingdom	S-band	51°14'31.4"N	000°37'06.4"W	53.2	38.8	36.0%	4 minutes transmitting / 11 minutes visible
Zallaq, Bahrain	S-band	26°03'05.4"N	50°30'12.4"E	50	37.8	36.0%	4 minutes transmitting / 11 minutes visible
Singapore	S-band	1°22'34.0"N	103°58'10.9"E	50	37.8	36.0%	4 minutes transmitting / 11 minutes visible
Cordoba, Argentina	S-band	31°31'25.3"S	64°27'44.6"W	55	35.8	36.0%	4 minutes transmitting / 11 minutes visible
Dublin, Ireland	S-band	53°24'23.8"N	6°13'27.8"W	50	37.8	36.0%	4 minutes transmitting / 11 minutes visible

Comments

The requested federal coordination response date is **May 10, 2025 COB ET** to achieve FCC licensing before the launch provider's licensing deadline.

Mission description. The Spirit-EEL mission would include three 3U cubesats providing training data streams to finetune Basalt's software and demonstrate its reliability. The satellites would (1) leverage AI agents and multi-agent systems to effectively manage and control unpropelled imaging spacecraft in orbit with high service uptime and minimal human intervention; (2) "roleplay" as a commercial imaging service constellation and manage changing data, thermal, and power needs of the camera while keeping the spcaecraft bus alive while enlisting Basalt's algorithms; and (3) schedule time to downlink image data of the Earth.

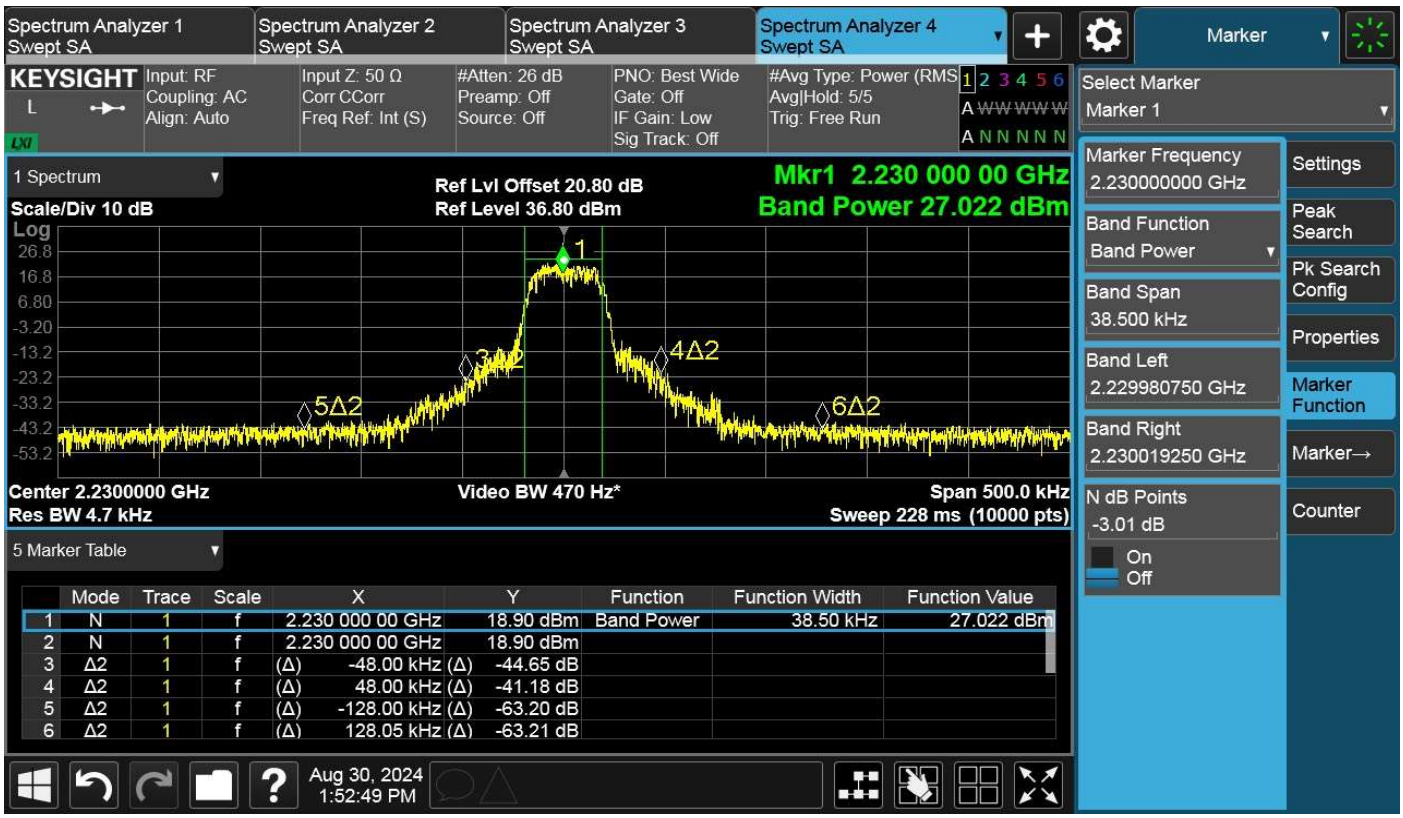
All space-to-Earth bands (power levels). Basalt will reduce radiofrequency power as necessary to maintain operations within the PFD limits at all times.

S-band (space-to-Earth) (SRS (deep space) protection). The following calculation show the 2200-2290 MHz signal will meet the power spectral flux-density limit in the 2290-2300 MHz band (see Rec. ITU-R SA.1157 at Table 5).

= EIRP – 10*log(bw) – rejection – 10*log(4·pi·R^2), where EIRP is -12.2 dBW, bandwidth is 39.2 kHz or 39200 Hz, rejection factor is 107 dB, and R is 400 km or 400000 m
= –12.2 – 45.93 – 26 – 122.04
= –287.17 dBW/m^2/Hz (below the –257.0 dBW/m^2/Hz limit)

The adjacent spectrum roll-off plot confirms that this signal would remain below the limit.

UHF (space-to-Earth) beacon. Each satellite would have a UHF (space-to-Earth) beacon with an automatic cessation mechanism that would support only the mission's commissioning phase (first 3 days). The beacon's concept of operations are the following: (1) the satellite deploys from the launch vehicle; (2) the flight computer boots, and the beacon setting is off; (3) the beacon is activated by the flight computer; (4) beaconing occurs every 127 seconds; (5) the beacon setting is turned off after contact occurs, or after a flight computer timeout of 2 hours; and (6) if the flight computer is unresponsive or crashes, the satellite reboots the system and the beacon is reset to its default disabled state. The spacecraft's reboot function is triggered by a double redundant watchdog timer in the battery and power systems.


Spectrum Analyzer 1
Swept SA
Spectrum Analyzer 2
Swept SA
Spectrum Analyzer 3
Swept SA
Spectrum Analyzer 4
Swept SA
Marker
KEYSIGHT
Input: RF
Coupling: AC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
#Atten: 26 dB
Preamp: Off
Source: Off
PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Avg|Hold: 5/5
Trig: Free Run
1 2 3 4 5 6
A WW WW W
A N N N N N
Select Marker
Marker 1
1 Spectrum
Ref Lvl Offset 20.80 dB
Ref Level 36.80 dBm
Mkr1 2.230 000 00 GHz
Band Power 27.022 dBm
Scale/Div 10 dB
Log
26.8
16.8
6.80
-3.20
-13.2
-23.2
-33.2
-43.2
-53.2
1
2Δ2
3Δ2
4Δ2
5Δ2
6Δ2
Center 2.2300000 GHz
Res BW 4.7 kHz
Video BW 470 Hz*
Span 500.0 kHz
Sweep 228 ms (10000 pts)
Marker Frequency
2.230000000 GHz
Band Function
Band Power
Band Span
38.500 kHz
Band Left
2.229980750 GHz
Band Right
2.230019250 GHz
N dB Points
-3.01 dB
On
Off
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker→
Counter
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.230 000 00 GHz 18.90 dBm Band Power 38.50 kHz 27.022 dBm
2 N 1 f 2.230 000 00 GHz 18.90 dBm
3 Δ2 1 f (Δ) -48.00 kHz (Δ) -44.65 dB
4 Δ2 1 f (Δ) 48.00 kHz (Δ) -41.18 dB
5 Δ2 1 f (Δ) -128.00 kHz (Δ) -63.20 dB
6 Δ2 1 f (Δ) 128.05 kHz (Δ) -63.21 dB
Aug 30, 2024
1:52:49 PM

ATTACHMENT C (OWNERSHIP INFORMATION)

This attachment includes the ownership information sought in the attached Form 312, Main Form.[1]

* * *

Basalt is a privately held corporation organized under Delaware law. The following parties are shareholders with 10% or more of the equity and/or voting stock in Basalt:

Name: Maximillian Bhatti (USA)
Ownership: 51%

Name: Alex Choi (UK)
Ownership: 49%

The following individuals are Basalt's directors:

Name	Citizenship
Maximillian Bhatti	USA
Alex Choi	UK

The following individuals are Basalt's officers:

Name	Title	Citizenship
Maximillian Bhatti	CEO	USA
Alex Choi	COO	UK

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

1244 Larkin Street
Unit 303
San Francisco, CA 94109
USA

[1] Form 312, Main Form questions 30-34 are inapplicable because Basalt does not seek broadcast, common carrier, aeronautical en route, or aeronautical fixed radio station licensing. *See* 47 U.S.C. § 310(b).