

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of	)	
	)	
IMPULSE SPACE, INC.	)	File Number: SAT-LOA-20251230-00409
	)	
Application for Authority to Launch and	)	Call Sign:
Operate a Non-Geostationary Orbit Spacecraft	)	
in the Space Operation Service and Space	)	
Research Service in S-band and X-band	)	

APPLICATION

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APPLICATION

Impulse¹ requests authority to operate one non-geostationary orbit (“NGSO”) spacecraft, Impulse-4, under the Part 25 licensing framework.² The spacecraft is a free-flying orbital transfer vehicle (“OTV”) that will demonstrate on-orbit maneuvering capabilities.³ The targeted US federal coordination response date is May 6, 2026, and the requested license issue date is June 12, 2026.⁴

I. MISSION AND PUBLIC INTEREST

Impulse is pioneering the future of in-space transportation by developing rapid orbital mobility spacecraft capabilities.⁵ After three successful launches and now with its fourth spacecraft, Impulse-4 acts as another steppingstone toward creating an OTV that can deliver,

¹ Impulse Space, Inc. (“Impulse”) is a Redondo Beach, California-based company incorporated in Delaware in 2021.

² See 47 C.F.R. § 25.101 *et seq.*

³ Impulse will supplement this application with the third-party spacecraft information subsequently.

⁴ This date is when SpaceX requires all regulatory document submission for the Transporter-17 mission.

⁵ See generally *Space Innovation; Facilitating Capabilities for In-space Servicing, Assembly, and Manufacturing*, Notice of Inquiry, 37 FCC Rcd 10022 (2022).

rendezvous, lower, and/or de-orbit space objects. It also acts as an innovation testbed for future small satellite communications systems and other critical avionics equipment supporting future space missions. Approving Impulse-4's operation would advance the Commission's commitment to fostering US space innovation, commerce, and science.

II. SYSTEM DESCRIPTION

Attachment A (Technical Annex) and Attachment B (Coordination Spreadsheet) capture the orbital, earth station, and radiofrequency parameters. Impulse-4 will operate in the space operation ("SOS") and space research services ("SRS").

SOS. The SOS is concerned "exclusively with the operation of spacecraft, in particular space tracking, space telemetry and space telecommand."⁶ Impulse will command and receive telemetry from Impulse-4 to ensure safe spacecraft operations. As a result, Impulse-4 qualifies as SOS.

SRS. The SRS covers spacecraft that participate in "scientific or technological research purposes."⁷ The International Telecommunication Union ("ITU") space research handbook further elaborates the scientific and technological research purposes.

Scientific research. "Scientific disciplines provide information with respect to the solar system, the nature and structure of the universe, and the origin and fate of matter."⁸

Technological research. "The space research technology programmes focus on development and validation in space of advanced technologies needed for: – fabrication and assembly of space structures; – construction of electro/mechanical systems; – the study of fluid

⁶ 47 C.F.R. § 2.1(c).

⁷ *Id.*

⁸ ITU SRS Handbook at 1.

behaviour and transport phenomena; – robotics for structure assembly and *on-orbit satellite servicing*; – space processing and manufacturing techniques. In particular, the study of the micro-gravity environment of space for scientific and commercial purposes develops and enhances the ability of man to live and work in space for extended periods of time[] and increases our understanding of materials science and biomedical sciences.”⁹

Impulse-4 is conducting technological research consistent with the cited ITU and FCC rules and literature.¹⁰ This mission will help develop a better understanding of how to support future in-space transportation capabilities, and the SRS frequencies will support the related command and downlink.

Table 1 captures Impulse-4’s frequency plan.

⁹ *Id.* (emphasis added).

¹⁰ Further, the Commission “need not read the definition of space research services, ‘a radiocommunications service in which spacecraft or other objects in space are used for scientific or technological research purposes,’ to be fundamentally at odds with commercial satellite operations given that the plain language of the definition does not exclude commercially-based scientific or technological research operations.” *Facilitating Capabilities for In-space Servicing, Assembly, and Manufacturing et al.*, Notice of Proposed Rulemaking, 39 FCC Rcd 1864 ¶ 34 (2024). Given this recent FCC declaration, Impulse’s scientific and technological research can be commercial while operating as SRS.

Table 1: Frequency Plan¹¹

Beam ID	Targeted Frequency (MHz) ¹²	Link Direction	Description	Service ¹³	Int'l Allocation?	Non-Federal US Allocation?
US	2025-2110	Earth-to-space	service (primary)	SOS SRS	Yes	No
			TT&C (primary)	SRS	Yes	Yes
DX	8450-8500	space-to-Earth	service (primary)	SRS	Yes	Yes
			TT&C (primary)	SRS	Yes	Yes

III. WAIVER REQUESTS

The Commission may waive any of its rules for “good cause.”¹⁴ 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.¹⁵ In general, the Commission will grant a waiver of its rules if the relief requested would not undermine the policy objective of

¹¹ Impulse-4 will also have two global positioning system (“GPS”) receivers. The GPS payload will support on-orbit determination. It will only passively monitor the readily accessible GPS L1 (center frequency of 1575.42 MHz) and L2 (center frequency of 1227.60 MHz) signals without decoding or decrypting any encrypted content within these waveform modulations. Reception of the GPS L1 and L2 signals is with pre-existing signals that have not been altered to provide service to Impulse-4. Such operations are permissible. *See, e.g.,* Loft Orbital Solutions Inc., Stamp Grant, ICFS File No. SAT-LOA-20220606-00057, at n.4 (granted Nov. 15, 2022); Spire Global, Inc., Stamp Grant, ICFS File No. SAT-MOD-20200603-00065, at 3 (granted Nov. 9, 2022).

¹² Final frequency selection will depend on coordination results.

¹³ *See infra* Narrative § III.A and Attachment A § IV for the waiver request and justifications to use the 2025-2110 MHz and 8450-8500 MHz bands as a non-conforming service on a non-interference, non-protected basis to the extent necessary.

¹⁴ 47 C.F.R. § 1.3. *See Ne. 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).

¹⁵ *Ne. Cellular*, 897 F.2d at 1166.

the rule in question and would otherwise serve the public interest.¹⁶ 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.”¹⁷

Good cause exists in this case to waive the following rules to the extent necessary to consider and grant the application because the project will benefit the public by (i) testing orbit-maneuvering capabilities that will help enhance the space environment; and (ii) supporting the Commission’s goal of enhancing space safety and sustainability.¹⁸

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

Erring cautiously, Impulse seeks a waiver to operate SOS and SRS in 2025-2110 MHz and 8450-8500 MHz on a non-conforming basis. Good cause exists in this case to waive the frequency assignments and frequency allocation table rules to the extent necessary to consider and grant the application.

Impulse-4 will not pose interference issues for two primary reasons. *First*, the spacecraft will accept interference from any authorized service. *Second*, the spacecraft will not increase

¹⁶ *WAIT Radio*, 418 F.2d at 1157.

¹⁷ *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 14.0-14. 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).

¹⁸ See 47 U.S.C. § 151 (tasking the Commission with regulating radio communications “[f]or the purpose of,” among other things, “so as to make available, so far as possible, to all the people of the United States . . . a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities” and to “promot[e] safety of life and property”).

interference potential into any authorized service. It meets the relevant out-of-band emissions limits. It also resembles operations authorized in the band today because it uses a limited bandwidth and duty cycle while transmitting only when in line of sight of the satellite or earth station (depending on the link direction). Impulse commits to coordinating such limited operations with co-frequency missions, including US government operations. It also commits to working with its ground station partners to secure non-US earth station licensing and adjust operations as needed to satisfy any related licensing conditions.

Impulse-4 and similar missions face limited spectrum access and an underdeveloped ecosystem.

Limited spectrum access. If Impulse-4 does not constitute SOS or SRS (which Impulse does not believe is true for the reasons outlined above), then the only other available service allocations are fixed-satellite service and potentially mobile-satellite service. In the frequency allocation table, the only available SOS allocations are 2025-2110 MHz and 2200-2290 MHz based on Impulse-4's system needs. Impulse has already sought authority for these bands on a conforming basis but notes that US government coordination drastically restricts the associated center frequency possibilities and numbers, duty cycle length, bandwidth size, and geographic coverage areas (among other parameters). Further, in the frequency allocation table, the potentially available fixed-satellite service and mobile-satellite service allocations are between 1 GHz and 30.0 GHz. Impulse has not sought authority for these bands on any basis because they are subject to prolonged and complex processing rounds and coordination that did not meet Impulse-4's build, deployment, and operational timeline.

Underdeveloped ecosystem. This limited spectrum access has erected an underdeveloped ecosystem. The radios and ground station infrastructure have all centered on the 2 GHz and 8 GHz

bands,¹⁹ and as a result, Impulse had limited choices when designing Impulse-4 on a quick build, deployment, and operational timeline.

Impulse-4 will benefit the public. By testing Impulse-4 and its related equipment, Impulse can validate and diversify space domain awareness and in-space servicing capabilities to advance US space science, commerce, and innovation leadership. For these reasons, granting this waiver (if needed) is justified.

B. 47 C.F.R. §§ 25.156, 25.157 (NGSO Processing Round)

Impulse requests a waiver of the FCC rules that stipulate the processing of “NGSO-like satellite systems” under a processing round framework.²⁰ Rather than applying this framework, Impulse requests application of the first-come, first-served procedure adopted for “GSO-like satellite systems.”²¹ The Commission has accepted such requests previously. On those occasions, applicants demonstrated that their systems would avoid interference events through means such as transmission scheduling and would not preclude future entrants from using the same spectrum, unlike the NGSO-like systems that require full-time system availability and processing rounds.²²

Spectrum sharing is possible here with existing and future operators. Impulse-4 does not require full-time system availability and will complete its mission in less than five years. It will transmit and receive only in short periods of time while visible to limited receiving/transmitting

¹⁹ Despite multiple third-party vendors encouraging 8025-8400 MHz usage, Impulse purposefully avoided this band given Impulse-4 operations did not meet the band’s Earth-exploration satellite service qualification threshold.

²⁰ 47 C.F.R. §§ 25.156, 25.157.

²¹ *Id.* § 25.158.

²² See e.g., *Space Imaging, LLC*, Order et al., 20 FCC Rcd 11964 ¶ 10 (IB 2005) (“*Space Imaging Order*”); Stamp Grant, Spaceflight, Inc., ICFS File No. SAT-LOA-20220111-00007 (granted May 10, 2022); Stamp Grant, Loft Orbital Solutions, Inc., ICFS File No. SAT-LOA-20220606-00057 (granted Nov. 15, 2022).

earth stations. As noted above, for harmful interference to occur, both Impulse-4 and another satellite would have to be visible to the earth station and transmitting or receiving using the same frequencies at the exact same time. In such an unlikely event, any resulting inline interference could be avoided through coordination. Impulse commits to such coordination.

C. 47 C.F.R. §§ 25.164, 25.165 (Milestone and Surety Bond)

Impulse requests waiver of the milestone and surety bond requirements. Three factors support waiver in this instance. *First*, waiver is consistent with the purpose of these requirements to prevent FCC space station authorization holders from warehousing spectrum.²³ As discussed, Impulse’s proposed spectrum use would not be mutually exclusive and would not preclude other parties from seeking authorization for similar frequency bands. No basis exists to impose such milestone or bond requirements.

Second, the Commission’s milestone rules require an operator to launch half its NGSO constellation within six years of authorization.²⁴ Impulse-4, a single spacecraft, is expected to launch this year and complete its mission in less than five years. Applying the milestone requirement unnecessarily burdens Impulse.

Third, the bond cost should not be disproportionate to the overall mission cost.²⁵ The Commission has found “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,

²³ See, e.g., *Expediting Initial Processing of Satellite and Earth Station Applications; Space Innovation*, Report and Order et al., 38 FCC Rcd 8838 ¶ 26 (2023) (“[T]he concerns about warehousing of spectrum and orbital resources through placeholder applications have been effectively addressed through our milestone and bond requirements.”).

²⁴ See 47 C.F.R. § 25.164(b).

²⁵ See *Amendment of the Commission’s Space Station Licensing Rules and Policies*, First Order on Reconsideration et al., 19 FCC Rcd 12637 ¶¶ 28-31 (2004).

which generally cost several hundred million dollars each to launch and operate.”²⁶ But the same is not true for a single satellite with a limited mission duration. For Impulse-4, the bond and associated fee, even for a short period of time, would be excessive, disproportionate, and unfair. As a result, waiving the milestone and bond requirements is justified. Should the Commission apply the milestone and bond obligations, however, the Impulse-4 bond posting deadline should occur 90 days after the grant consistent with recent similar FCC authorizations.²⁷

D. 47 C.F.R. § 25.217 (Default Service Rules)

Impulse requests waiver of the default service rules. Because the Commission has not adopted band-specific rules for the services Impulse proposes to provide, the default service rules would apply.²⁸ But the Commission has waived this requirement when finding that compliance with the technical requirements in FCC rule Parts 2 and 25 and applicable ITU Radio Regulations are sufficient to prevent harmful interference.²⁹ Such waiver is appropriate because Impulse commits to satisfying the FCC technical requirements and applicable ITU Radio Regulations and will further coordinate with other operators to prevent harmful interference.

E. 47 C.F.R. § 25.114 (Schedule S)

A Schedule S form accompanies this application.³⁰ Impulse cannot accurately describe the proposed operations due to Schedule S limitations and, therefore, requests waiver of the Schedule

²⁶ *Comprehensive Review of Licensing and Operating Rules for Satellite Services*, Second Report and Order, 30 FCC Rcd 14713 ¶ 60 (2016).

²⁷ See, e.g., Momentus, Stamp Grant, ICFS File No. SAT-LOA-20220504-00047 (granted Nov. 15, 2022).

²⁸ See 47 C.F.R. § 25.217(b).

²⁹ See, e.g., *Space Imaging Order* ¶ 25.

³⁰ See 47 C.F.R. § 25.114(c).

S to the extent necessary based on the additional related clarifications in Attachment A (Technical Annex) § 0.

F. 47 C.F.R. § 25.112 (Application Processing)

Impulse requests waiver of the Commission’s application processing requirements. The Commission may dismiss submissions if they contain incomplete information or internal inconsistencies.³¹ Even in these cases, however, the Commission’s rules provide that the Commission may accept a defective application if accompanied by an appropriate waiver request.³² Impulse asks that the Commission permit Impulse to supplement its application if additional information or explanation is necessary. Doing so would avoid unduly harsh results and would conserve limited FCC resources by allowing any concerns to be addressed on an issue-specific basis.

IV. OTHER MATTERS

A. ITU Requirements

When issuing launch-and-operational authority, the Commission submits advance publication information (“API”) to the ITU.³³ In concert with this application, Impulse will submit the ITU API and unconditionally accepts all associated cost recovery responsibilities.

B. Ownership Information

Impulse’s ownership structure appears in Attachment C (Ownership Information).

³¹ *See id.* § 25.112(a).

³² *See id.* § 25.112(b)(1).

³³ *See id.* § 25.111.

C. NOAA Licensing

Impulse will ensure it satisfies relevant National Oceanic and Atmospheric Administration (“NOAA”) licensing obligations.

V. CONCLUSION

With the requested FCC approval for Impulse-4, Impulse can continue trialing an OTV critical to preserving and improving space for all.

Respectfully submitted,

/s/ Margaret Abernathy

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March 6, 2026

ATTACHMENT A (TECHNICAL ANNEX)

This attachment offers supplemental technical details regarding the Impulse-4 satellite because the above Narrative and attached Form 312, Schedule S require further clarification.

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I. SYSTEM DESCRIPTION

Impulse-4 is a redesigned, Impulse-built spacecraft featuring advancements from Impulse-1, Impulse-2, and Impulse-3. The spacecraft is a free-flying OTV that will demonstrate on-orbit maneuvering capabilities. For clarity, there are no third-party hosted or deployed payloads on Impulse-4.

After separating from the launch vehicle, Impulse will commission Impulse-4 and maneuver within the orbits as described in the attached orbital debris mitigation plan (“ODMP”). At mission end, Impulse-4 will maneuver to a parking orbit and, prior to naturally reentering the atmosphere, all stored energy will be passivated as explained in the attached orbital debris mitigation plan.

II. POWER LIMITS

Impulse-4 will satisfy relevant in-band and out-of-band power limits.

A. In-Band Power

In the 2025-2110 MHz band, the FCC rules specify earth station transmit requirements to protect fixed and mobile services. The equivalent isotopically radiated power (“EIRP”) transmitted in any direction toward the horizon by an earth station shall not exceed the following limits:

in frequency bands between 1 GHz and 15 GHz
+40 dBW in any 4 kHz band for $\theta \leq 0^\circ$
+40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$; and

in frequency bands above 15 GHz
+64 dBW in any 1 MHz band for $\theta \leq 0^\circ$
+64 + 3 θ dBW in any 1 MHz band for $0^\circ < \theta \leq 5^\circ$,

where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.¹

For elevation angles greater than 5°, the FCC rules do not restrict the earth station's EIRP toward the horizon.² Impulse will transmit only above 5° elevation angle and, therefore, satisfies the above referenced EIRP limits.

In the 8450-8500 MHz band (space-to-Earth), the FCC rules do not specify power limits; however, ITU Radio Regulations Table 21-4 imposes power flux-density ("PFD") limits at the Earth's surface.³ According to ITU Table 21-4, space station PFD emissions in this frequency range at the Earth's surface shall not exceed the following values:

- -150 dB(W/m²) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- $-150 + 0.5 (\delta - 5)$ dB(W/m²) in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and
- -140 dB(W/m²) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

The Schedule S shows compliance with these limits at the nominal operational altitude.⁴

B. Out-of-Band Power

The US federal agencies require out-of-band-emissions limits compliance to safeguard SRS (deep space) operations adjacent to the 8450-8500 MHz band.⁵ Impulse will use a combination of baseband digital filtering and hardware radio frequency filtering to ensure that its

¹ See 47 C.F.R. § 25.204(a)-(b).

² See *id.* § 25.204(c).

³ See ITU Radio Regulations Table 21-4.

⁴ Impulse will reduce Impulse-4's power as the satellite decreases altitude to ensure compliance with the ITU's limits.

⁵ See Rec. ITU-R SA.1157 at Table 5; Rec. ITU-R SA.1014 at Table 3.

out-of-band emissions will not cause interference to authorized services in adjacent frequency bands. Impulse will also submit spectrum roll-off measurements to the US federal agencies, and if such plots are unsatisfactory or Impulse 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

Impulse 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

Impulse will not interfere with existing operators and will not materially constrain future operators from using the requested frequency bands. In the requested spectrum, satellite systems normally communicate only for short periods of time while visible from dedicated earth stations (typically less than 10 minutes for a single pass). For interference to occur, (i) either another operator's satellite would have to travel through the antenna beam of Impulse's serving earth stations or the one Impulse 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, Impulse 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 commits to undertaking similar coordination for the instant system.⁶ Impulse anticipates that successful coordination in these bands is achievable

⁶ See, e.g., *Spire, Stamp Grant*, ICFS File Nos. SAT-MOD-20200603-00065 et al. (granted in part Nov. 9, 2022); see also, e.g., *Spire Global, Inc.*, Order and Declaratory Ruling, ICFS File Nos. SAT-LOA-20151123-00078 et al., 39 FCC Rcd 5854 (2024).

because Impulse-4 will only communicate when in view of few earth stations using small bandwidths, limited duty cycle, frequency-agile software-defined radios, and interference-mitigation techniques, including conjunction-avoidance angles. Moreover, the proposed operations are nearly identical to those currently coordinated for another constellation, which has been operating on orbit for more than a decade with no reports of interference.⁷

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.

⁷ See *supra* note 6.

A. 2025-2110 MHz (Boden, Sweden)



B. 8450-8500 MHz (Boden, Sweden)



VI. SCHEDULE S CLARIFICATIONS

The following Schedule S disclosures require further clarification.

Orbital plane 1. Impulse-4 has an orbital altitude and inclination range. Impulse has listed the nominal values in Schedule S and specifies these values in Attachment B (Coordination Spreadsheet). Further, Impulse-4 is the only satellite in the orbital plane, so the satellite spacing, phase angle spacing, and first satellite initial phase angle fields are inapplicable, and Impulse has listed placeholder values for Schedule S completeness.

Transmitting beam DX – peak gain. This beam has two operational modes with different peak gain values (6.5 dBi and 26.5 dBi). The Schedule S shows the peak gain value and the associated maximum transmit EIRP density of the default operational mode at the insertion orbit altitude.

Transmitting beam DX – maximum transmit EIRP density. The maximum transmit EIRP density field is based on various channel bandwidths. Schedule S lists the maximum transmit EIRP density of the default operational mode at the insertion orbit altitude.

Transmitting beam DX – maximum PFD. Schedule S includes representative PFD calculations of the default operational mode at the insertion orbit altitude. Impulse-4 has adaptive rate control and can lower power (or cease certain modes), bandwidth, and other technical parameters at different altitudes if needed.

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/ Nicholas Simon

Nicholas Simon
Senior Mission Manager

ATTACHMENT B (COORDINATION SPREADSHEET)

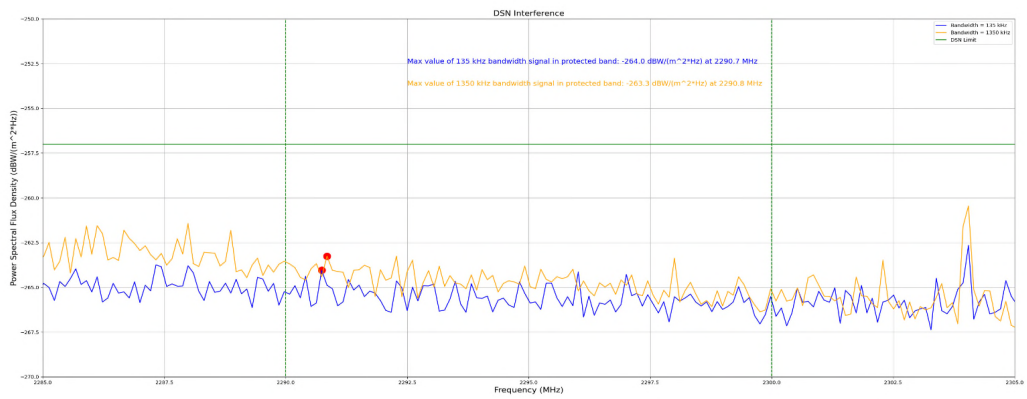
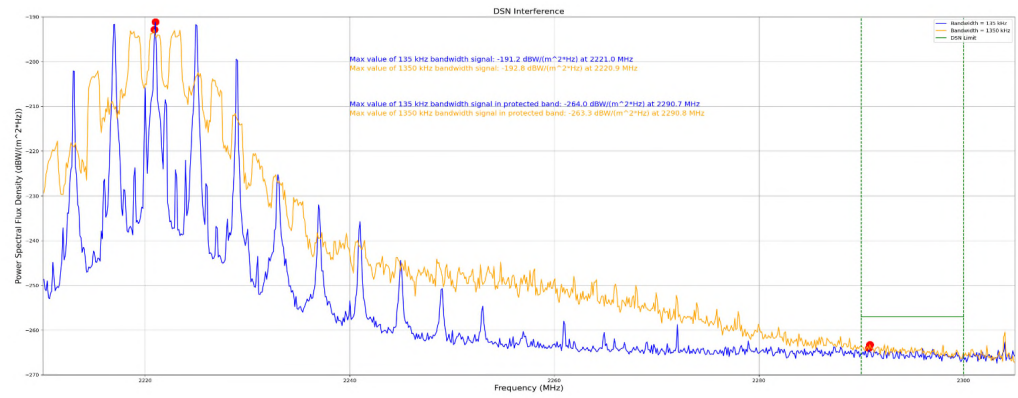
Mission Parameters		
Attribute	Value	Comment
Mission Name	Impulsive-4	N/A
Responsible Company	Impulsive Space Inc. Nicholas Simon (ns@impulsivespace.com)	N/A
POC(s)	George John (george.john@hoganlovels.com)	N/A

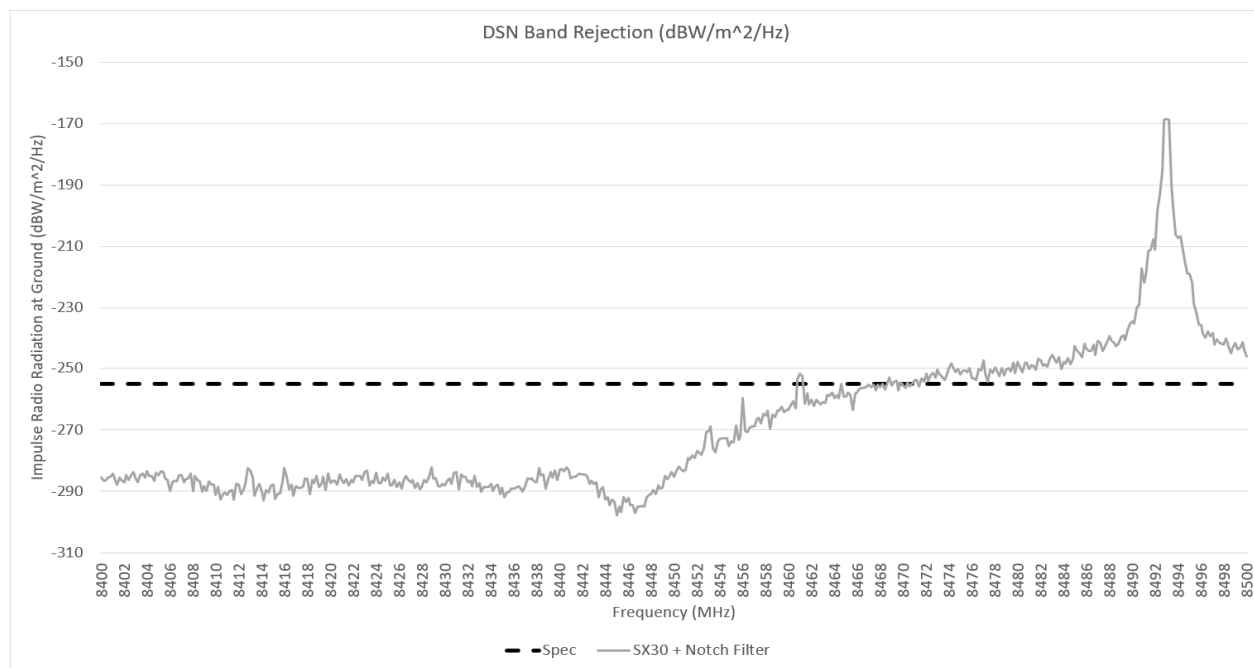
Link Parameters			
Frequency Band	Center Frequency (MHz)	Bandwidth (MHz)	Polarization Type (optional)
2025-2110 (Impulse-2)	2044	0.135	RHCP
	2053	0.675	
2025-2110 (Impulse-3)	2055	0.0575	
	2053	0.270	RHCP
		0.625	
2025-2110 (Impulse-4)	2050	0.0575	
	2059	0.270	RHCP
		0.575	

Crosslink Parameters						
Frequency Band	Center Frequency (MHz)	Bandwidth (MHz)	Set Tx Power (dBm) (at the antenna port)	Set Tx Ant Gain (dBi)	Polarization Type (optional)	Receive Satellite Network/System
N/A	N/A	N/A	N/A	N/A	N/A	N/A

[illegible]

<u>Impulse-4 Comments</u> The targeted federal coordination response date is <u>May 6, 2026 COB ET</u> to achieve FCC licensing before the launch provider's licensing deadline. <i>Mission description.</i> Impulse-4 will operate space research service (SRS) and space operation service (SOS). For SRS, the spacecraft will conduct a technology demonstration of its propulsion system. For SOS, the spacecraft will receive commands and transmit telemetry. <i>System orbit parameters.</i> Orbital planes will include various apogee and perigee combinations within the listed range to accommodate the propulsion testing. <i>All bands (multiple center frequencies and bandwidths).</i> All listed possibilities are needed to ensure sufficient data throughput (as well as redundancy during certain mission phases) at all operational altitudes. The small bandwidths are used during (i) launch-and-early-orbit-phase operations and (ii) normal widebeam antenna operations. The large bandwidths are used during normal narrowbeam antenna operations. <i>All bands (duty cycle calculations).</i> Impulse calculated the listed pass durations using the deployment altitude apogee and perigee. Pass durations will change as a function of altitude but duty cycle will remain constant at 100%. <i>All space-to-Earth bands (power levels).</i> Impulse will reduce radiofrequency power and bandwidth as necessary to maintain operations within the PFD limits at all times. <i>X-band (space-to-Earth) (SRS (deep space) protection).</i> Impulse satisfies the ITU-R SA.1157-1 protection criteria (see X-band Spectrum Roll-off Plots sheet) and, therefore, does not require further conditioned use.	<u>Impulse-3 Comments</u> The targeted federal coordination response date is <u>April 14, 2025 COB ET</u> to achieve FCC licensing before the launch provider's licensing deadline. <i>Mission description.</i> Impulse-3 will operate space research service (SRS) and space operation service (SOS). For SRS, the spacecraft will host a telescope for non-Earth imaging and receive telecommands and transmit data for its novel propulsion subsystem. For SOS, the spacecraft will receive commands and transmit telemetry. <i>System orbit parameters.</i> Orbital planes will include various apogee and perigee combinations within the listed range to accommodate the propulsion testing. <i>All bands (multiple center frequencies and bandwidths).</i> All listed possibilities are needed to ensure sufficient data throughput (as well as redundancy during certain mission phases) at all operational altitudes. The small bandwidths are used during (i) launch-and-early-orbit-phase operations and (ii) normal widebeam antenna operations. The large bandwidths are used during normal narrowbeam antenna operations. <i>All bands (duty cycle calculations).</i> Impulse calculated the listed pass durations using the deployment altitude apogee and perigee. Pass durations will change as a function of altitude but duty cycle will remain constant at 100%. <i>All space-to-Earth bands (power levels).</i> Impulse will reduce radiofrequency power as necessary to maintain operations within the PFD limits at all times. <i>X-band (space-to-Earth) (SRS (deep space) protection).</i> Impulse will cease transmissions over all SRS (deep space) sites to satisfy the ITU-R SA.1157-1 protection criteria and, therefore, does not submit a spectrum roll-off plot. Impulse expects ongoing hardware development to meet roll-off requirements and will submit a spectrum roll-off plot once available.	<u>Impulse-2 Comments</u> 1. The targeted federal concurrence date is <u>Monday, August 12, 2024 COB ET</u> to achieve FCC licensing before the launch provider's licensing deadline. 2. Impulse expects to station keep for the initial ~0.5 years and naturally degrade orbits subsequently during the remaining ~5.5 years. The stationkeeping orbit is 510 km x 510 km (+/- 20 km) (97.5 deg ± 2.0 deg). After the stationkeeping phase, the lowest possible operational orbit is 450 km x 450 km (97.5 deg ± 2.0 deg). 3. The spacecraft will not maintain LTAN and is near polar (not true SSO). 4. Impulse will reduce radiofrequency power as necessary to maintain operations within the PFD limits at all times. 5. For X-band, Impulse will cease transmissions over all deep space network sites to satisfy the ITU-R SA.1157-1 protection criteria and, therefore, does not submit a spectrum roll-off plot. For S-band, Impulse will submit a spectrum roll-off plot soon and, if it does not, will cease transmissions over all deep space network sites to satisfy the ITU-R
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ATTACHMENT C (OWNERSHIP INFORMATION)

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

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Impulse is a privately held corporation. The following individuals and entities hold 10% or more of the equity and/or voting interest in Impulse.

Shareholder	Citizenship or Incorporation Country	Equity and/or Voting Interest
Thomas John Mueller	USA	17.1%

The following individuals are board directors.

Name	Citizenship
Thomas John Mueller	USA
Eric Andrew Romo	USA
John William Raymond	USA

The following individuals are officers.

Name	Title	Citizenship
Thomas Mueller	CEO	USA
Eric Andrew Romo	President; Chief Financial Officer	USA
Margaret Abernathy	Secretary	USA

The following mailing address is for all board directors and officers.

2651 Manhattan Beach Boulevard
Redondo Beach, CA 90278

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