

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

In the Matter of)	
)	
Mitigation of Orbital Debris in the)	IB Docket No. 18-313
New Space Age)	
)	
Space Innovation)	IB Docket No. 22-271

Comments of TechFreedom

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Summary

The Commission's habit of ignoring warnings about the limits to its own power seems to be on full display in this proceeding. Statutory authority for FCC regulation of orbital debris remains as doubtful as ever, even as the Commission continues to rely on the general "public interest" standard of the Communications Act to impose orbital debris requirements on licensees. It's a "wafer-thin reed" that's unlikely to withstand judicial scrutiny.

Beyond these legal considerations, the regulatory approach that the Commission has used to process satellite applications needs a complete overhaul. Ad hoc conditions placed on individual licensees in response to a worldwide problem are both inadequate as a solution *and* unnecessarily burdensome to the American space industry. Consistently applied license conditions tied to clear, specific rules that everyone can understand would be much better.

The Commission therefore needs to reassess what it's been doing and speak more clearly to the public about its sources of authority and the extent of the powers that it claims. To that end, it should clarify that the National Environmental Policy Act does not apply in space. Doing so isn't just textually sound law; it will also silence many frivolous objections to future space activity.

Bright-line rules and safe harbor provisions for speedy grants could both help bring much-needed regulatory clarity in cases where they apply. The object-years metric that the Commission inquires about is a rough but useful one; this comment closes with several proposals to improve its precision by having the Commission such factors as satellite mass and cross-section, the past practices of operators related to collision avoidance, and the orbits into which satellites are launched.

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TechFreedom, pursuant to Sections 1.415 and 1.419 of the Commission’s rules,¹ hereby files these Comments in response to the Public Notice (“Refresh Public Notice”) released by the Commission on May 2, 2024, in the above-referenced proceedings.² The record does need a refresh based on evolving industry best practices and the Commission’s growing experience licensing satellite systems. But what has also changed since the record closed in late 2020, and what *is* changing as this round of comments are being filed, is the legal landscape surrounding how courts interpret agency authority, and the deference courts will give to agency decisions when it strays from its statutory mandate. This fundamental issue remains constant and cannot be avoided by the passage of time and the self-perceived mission creep of the FCC.

¹ 47 C.F.R. §§ 1.415 & 1.419.

² The Public Notice set the comment period as 30 days after publication in the Federal Register. The item appeared in the Federal Register on May 28, 2024. 89 Fed. Reg. 46052 (May 28, 2024), establishing the comment date as June 27, 2024, and the reply comment date as July 12, 2024 [hereinafter “Refresh Public Notice”]. These Comments are timely filed.

I. The FCC’s Statutory Authority over Orbital Debris Remains in Question

Once upon a time, the Commission exercised a degree of humility about regulating outer space activities. As recently as five years ago, the Commission was at least willing to entertain the thought that its statutory authority in this area might be limited.

With respect to the rules proposed here, the Commission revisits the Commission’s discussion in 2004, which addressed the Commission’s responsibilities and obligations under the Communications Act of 1934 (the Act). The 2004 Orbital Debris Order specifically referenced the Commission’s authority with respect to authorizing radio communications, including the statements in the Act that charge the FCC with encouraging “the larger and more effective use of radio in the public interest,” and provide for licensing of radio communications, upon a finding that the “public convenience, interest, or necessity will be served thereby.” Did the 2004 order cite all relevant and potential sources of Commission authority in this area? Do the provisions discussed, or other statutory provisions, provide the Commission with requisite legal authority to adopt the rules we propose today?³

Those days appear long gone. In the past few years, the FCC has embarked on a quest to regulate outer space unprecedented in its history. FCC Chair Rosenworcel has declared a “next-generation space race” that “requires new rules.”⁴ The FCC has stood up a separate Space Bureau.⁵ More recently, the Commission has embarked on a rulemaking proceeding

³ Mitigation of Orbital Debris in the New Space Age, Notice of Proposed Rulemaking, 84 Fed. Reg. 4742, 4744 (Feb. 19, 2019).

⁴ Space Exploration Holdings, LLC, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System, IBFS File No. SAT-LOA20161115-0018; Call Sign S2983; Application for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System Supplement, SAT-LOA20170726-00110, Call Sign S3018; Fed. Commc’ns Comm’n, Memorandum Opinion, Order and Authorization (Mar. 28, 2018), <https://docs.fcc.gov/public/attachments/FCC-18-38A1.docx> (statement of Comm’r Rosenworcel).

⁵ News Release, Fed. Commc’ns Comm’n, FCC Space Bureau & Office of International Affairs Launches April 11 (Apr. 7, 2023), <https://www.fcc.gov/document/fcc-space-bureau-office-international-affairs-launches-april-11>. TechFreedom applauded the creation of a separate bureau to expedite handling of the explosion of applications for communications facilities in space, but also warned that the Commission’s authority in this area is not unlimited. *See An FCC Space Bureau Is Great: A Federal Space Commission—Not So Much*, TECHFREEDOM (Nov. 4, 2022), <https://techfreedom.org/an-fcc-space-bureau-is-great-a-federal-space-commission-not-so-much/>.

aimed at establishing regulations for In-space Servicing, Assembly, and Manufacturing (“ISAM”).⁶ As our comments in that proceeding make clear, the FCC no longer wishes to regulate communication services and communications hardware used in space, it seeks to regulate the *activities* of U.S. citizens in outer space wholly apart from providing communications services.⁷ We’ve warned of this before,⁸ and simply seeking to refresh the record in this proceeding does nothing to alter this fundamental misstep.

A. The Commission Continues to Ignore Warnings of Overreach

The FCC has pursued this path notwithstanding persistent concerns raised by many that the Commission may be overstepping its statutory authority. These warnings have come from other executive agencies with an interest in or jurisdictional authority over space,⁹ and even from the congressional committee with direct oversight over space activities:

⁶ Facilitating Capabilities for In-Space Servicing, Assembly, and Manufacturing, Notice of Proposed Rulemaking (ISAM NPRM or NPRM), FCC 24-21, released February 16, 2024, <https://docs.fcc.gov/public/attachments/FCC-24-21A1.pdf>.

⁷ Comments of TechFreedom on Proposed Rules for Space Innovation and Facilitating Capabilities for In-Space Servicing, Assembly, and Manufacturing, IB Docket Nos. 22-271 & 22-272, 3-4 (Apr. 29, 2024), <https://techfreedom.org/wp-content/uploads/2024/04/TechFreedom-FCC-ISAM-Comments.pdf>.

⁸ See, e.g., *Continuing U.S. Leadership in Commercial Space at Home & Abroad: Hearing Before the H. Comm. on Space, Sci., & Tech.*, 118th Cong. (2023), <https://techfreedom.org/wp-content/uploads/2023/07/Space-Governance-Testimony-July-13-2023.pdf>; Comments of TechFreedom in Space Innovation; Facilitating Capabilities For In-Space Servicing, Assembly and Manufacturing, IB Docket Nos. 22-271 & 22-272 (Oct. 31, 2022), <https://techfreedom.org/wp-content/uploads/2022/10/TechFreedom-Comments-FCC-ISAM-NOI.pdf>.

⁹ See, e.g., Comments of U.S. Dep’t Com. on the Mitigation of Orbital Debris in the New Space Age at 15, IB Docket No. 18-313 (Apr. 5, 2019), <https://www.fcc.gov/ecfs/document/1040509194602/1> (“It is clear that, given the multiple regulatory schemes across executive branch agencies impacting space commerce generally and orbital debris specifically, commercial space policies must be based on the technical expertise of the whole government. To that end, the [Commerce] Department has contributed to interagency efforts to achieve these shared space policy goals by leading

As the bipartisan leadership of the Science Committee and our Space and Aeronautics Subcommittee wrote to your predecessor in April 2020, the Commission does not have clear authority from Congress, a fact which remains true today. We noted then that FCC's own Notice of Proposed Rulemaking, issued on February 19, 2019, states that the Commission may not have cited sufficient authority to promulgate initial orbital debris regulations. As we stated in 2020, regulatory action by the FCC at this time, without clear authority from Congress, will at the very least create confusion and undermine the Commission's work, and at worst undermine U.S. economic competitiveness and leadership in space.¹⁰

We understand the “gaps, overlaps, and stovepipes” that exist in the current regulatory system for space activities as well as anyone.¹¹ But just because the FCC believes there is a gap in the overall regulatory structure, it is not free to fill that gap absent clear statutory authority.

administration efforts to advance space commerce and The President's Space Policy Directives are producing results and increasingly support a thriving space commerce industry in the U.S. As it leads the federal effort to dramatically grow U.S. space commerce, the Department shares the Commission's objective ‘to ensure continued, safe operations in space and maximize space commerce investments and innovation.’ Without a collaborative approach across federal agencies and independent authorities this objective cannot be attained.” (footnote omitted).

¹⁰ Letter from Representative Eddie Bernice Johnson, Chairwoman, Comm. on Sci., Space, and Tech. et al., to the Honorable Jessica Rosenworcel, Chairwoman, Fed. Commc'ns Comm'n (Sept. 27, 2022), https://republicans-science.house.gov/_cache/files/f/4/f4208cb4-ee5a-4f59-ab65-0cc7cc0b8209/6F2AFE4C757C5AC039876863E3DF3EBA.2022-09-27-sst-bipartisan-letter-to-fcc-on-orbital-debris-mitigation.pdf (footnotes omitted).

¹¹ See J. Dunstan, *Regulating Outer Space: Of Gaps, Overlaps, and Stovepipes*, CTR. GROWTH & OPPORTUNITY (July 10, 2023), <https://www.thecgo.org/research/regulating-outer-space-of-gaps-overlaps-and-stovepipes/>; see also *Reopening the American Frontier: Exploring How the Outer Space Treaty Will Impact American Commerce and Settlement in Space, Before the S. Comm. on Commerce, Sci., & Transp. Subcomm. on Space, Sci., & Competitiveness*, 115th Cong. (2017) (written testimony of J. Dunstan & Berin Szóka), <https://www.commerce.senate.gov/services/files/A9AD88B2-9636-4291-A5B0-38BC0FF6DA90>, video of hearing available at <https://www.commerce.senate.gov/2017/5/reopening-the-american-frontier-exploring-how-the-outer-space-treaty-will-impact-american-commerce-and-settlement-in-space> (discussion of the responsibility of the U.S. government to “authorize” and “supervise” the activities of its citizens under Article VI of the 1967 Outer Space Treaty). Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. VI, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter OST].

B. The Commission Has a Poor Track Record in Court Regarding Overreach

The Commission’s reliance on the general “public interest” standard of the Communications Act¹² to impose orbital debris requirements on its licensees is, at best, a “wafer-thin reed”¹³ upon which to base rules. Given recent court decisions constraining an agency’s ability to read in new or expanded authority under its enabling statute,¹⁴ it is highly doubtful that a court would conclude that the Commission can merely recite the “public interest” standard to justify its reach this far into outer space on issues unrelated to spectrum and interference.

Extraordinary grants of regulatory authority are rarely accomplished through “modest words,” “vague terms,” or “subtle device[s].” *Whitman*, 531 U. S., at 468. Nor does Congress typically use oblique or elliptical language to empower an agency to make a “radical or fundamental change” to a statutory scheme. *MCI Telecommunications Corp. v. American Telephone & Telegraph Co.*, 512 U. S. 218, 229 (1994). Agencies have only those powers given to them by

¹² The Communications Act of 1934, 47 U.S.C. § 303(g); *see also* *Orbital Debris in the New Space Age*, IB Docket No. 18-313, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd. 4156 (2020) (2020 Order or 2020 FNPRM), ¶ 15 (“As the Commission then noted, the Act charges the FCC with encouraging ‘the larger and more effective use of radio in the public interest.’ Additionally, the Act provides for the licensing of radio communications, including satellite communications, only upon a finding that the ‘public convenience, interest, or necessity will be served thereby.’ These provisions of the Act have remained unchanged since the Commission’s previous analysis of its authority in this area, in which it concluded that orbital debris and related mitigation issues are relevant in determining whether the public interest would be served by authorization of any particular satellite-based communications system, or by any particular practice or operating procedure of such satellite systems.”) (footnotes omitted).

¹³ *See Ala. Ass’n of Realtors v. Dep’t of Health & Hum. Servs.*, 141 S. Ct. 2485, 2489 (2021) (“This claim of expansive authority under § 361(a) is unprecedented. Since that provision’s enactment in 1944, no regulation premised on it has even begun to approach the size or scope of the eviction moratorium. And it is further amplified by the CDC’s decision to impose criminal penalties of up to a \$250,000 fine and one year in jail on those who violate the moratorium. Section 361(a) is a wafer-thin reed on which to rest such sweeping power.”) (citations omitted).

¹⁴ *See W. Va. v. Envtl. Prot. Agency*, 142 S. Ct. 2587 (2022); *Nat’l Ass’n of Broads. v. Fed. Commc’ns Comm’n*, 39 F.4th 817 (D.C. Cir. 2022) (holding that the FCC may not adopt regulations expanding on the specific requirements of Section 317(c)).

Congress, and “enabling legislation” is generally not an “open book to which the agency [may] add pages and change the plot line.” E. Gellhorn & P. Verkuil, Controlling Chevron-Based Delegations, 20 Cardozo L. Rev. 989, 1011 (1999). We presume that “Congress intends to make major policy decisions itself, not leave those decisions to agencies.” United States Telecom Assn. v. FCC, 855 F.3d 381, 419 (CA DC 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc).¹⁵

In the same way the Commission couldn’t adopt “broadcast flag” requirements for television receivers that were, in essence, copyright enforcement measures, the FCC has a thin jurisdictional hook to promulgate orbital debris rules.¹⁶

Great caution is warranted here, because the disputed [] regulations rest on no apparent statutory foundation and thus appear to be ancillary to nothing. Just as the Supreme Court refused to countenance an interpretation of the second prong of the ancillary jurisdiction test that would confer “unbounded” jurisdiction on the Commission, *Midwest Video II*, 440 U.S. at 706, 99 S.Ct. 1435, we will not construe the first prong in a manner that imposes no meaningful limits on the scope of the FCC’s general jurisdictional grant.¹⁷

Ultimately, how far the FCC can go in claiming broad authority to regulate the non-communications activities of FCC licensees will be decided soon when the Supreme Court issues its decisions in both *Loper Bright Enterprises v. Raimondo*¹⁸ and *Relentless, Inc. v.*

¹⁵ *West Virginia v. EPA*, 142 S. Ct. at 2609.

¹⁶ *See Am. Library Ass’n v. Fed. Commc’ns Comm’n*, 406 F.3d 689, 700 (D.C. Cir. 2005) (“The insurmountable hurdle facing the FCC in this case is that the agency’s general jurisdictional grant does not encompass the regulation of consumer electronics products that can be used for receipt of wire or radio communication when those devices are not engaged in the process of radio or wire transmission.”).

¹⁷ *Id.* at 692.

¹⁸ *Loper Bright Enters. v. Raimondo*, 45 F.4th 359 (D.C. Cir. 2022), *cert. granted* (Jan. 17, 2024) (No. 22-451).

Department of Commerce.¹⁹ While the ultimate fate of *Chevron* deference is unclear,²⁰ it is quite clear that the courts are moving further away from simply rubber stamping agency decisions simply based on their claims of being the expert agency on the matter.

This is especially true here, where it is unclear whether the FCC is the true expert on outer space matters.²¹ Further, the amount of deference the courts will grant the FCC on outer space matters is also open to question, given that the jurisdictional boundaries between agencies are so unclear, and in many cases, overlapping.²² An agency cannot simply jump in to fill a perceived regulatory gap, especially where, as here, the President has already assigned one key aspect of orbital debris—space traffic management—to another agency.

To ensure safe coordination of space traffic in this future operating environment, and in recognition of the need for DoD to focus on maintaining access to and freedom of action in space, a civil agency should be the focal point for this collision avoidance support service. The Department of Commerce should be that civil agency.

The Secretaries of Commerce and Transportation, in consultation with the Chairman of the FCC, will assess the suitability of incorporating these updated

¹⁹ *Relentless, Inc. v. United States Dep't of Com.*, 62 F.4th 621 (1st Cir. 2023), *cert. granted* (Jan. 17, 2024) (No. 22-1219).

²⁰ See Corbin Barthold, *Ditch the Chevron Doctrine, Not the Chevron Decision*, TECHFREEDOM (July 20, 2023), <https://techfreedom.org/ditch-the-chevron-doctrine-not-the-chevron-decision-techfreedom-tells-supreme-court/>; Brief for TechFreedom as Amicus Curiae Supporting Petitioners, *Loper Bright Enters. v. Raimondo* (2023) (No. 22-451), <https://techfreedom.org/wp-content/uploads/2024/01/Loper-v.-Raimondo-SCOTUS-Brief-TechFreedom-No.-22-451.pdf>.

²¹ Comments of TechFreedom in Space Innovation & Facilitating Capabilities for ISAM, IB Docket Nos. 22-271 & 22-272, at 11 n.35 (Apr. 29, 2024), <https://techfreedom.org/wp-content/uploads/2024/04/TechFreedom-FCC-ISAM-Comments.pdf>.

²² For example, multiple agencies have their own rules regarding orbital debris mitigation. See, e.g., 14 C.F.R. § 417.129 (FAA orbital debris rules for launch and reentry); 15 C.F.R. Part 960, Appendix 1 (NOAA regulations on orbital debris rules for remote sensing licenses); NAT'L AERONAUTICS & SPACE ADMIN., NASA-STD-8719.14A, Process for Limiting Orbital Debris (2021) (NASA orbital debris policies for its missions); DEP'T DEF., DoD Directive 3100.10, Space Policy, (2012); DEP'T DEF., DoD Instruction 3100.12, Space Support (2000) (DoD guidelines on orbital debris mitigation).

standards and best practices into their respective licensing processes, as appropriate and consistent with applicable law.²³

II. The Commission Should Regulate Via Rules, Not Ad Hoc Conditions on Licenses

The Refresh Public Notice seeks to update the record in this proceeding because the satellite “industry is growing”; it also cited the “evolving commercial space landscape” and “the Space Bureau’s own experience in satellite licensing.”²⁴ The Commission has reacted to the development of the space economy not by promulgating new rules to recognize these changes, but rather by imposing more and more conditions on licenses. While such conditions are a common practice in FCC licensing, in most communications services regulated under the Communications Act, those conditions are limited and applied consistently across licensees. More fundamentally, those conditions generally are tied to clear, specific rules that everyone can understand. For example, broadcast power levels,²⁵ and AM daytime and nighttime operating limits,²⁶ printed on licenses are clear and easy to understand. The number of conditions tacked on to these licenses has remained relatively constant over the years.

The practice of the Space Bureau and its predecessor related to the satellite services has been different, however, with each new license seemingly issued with more and more

²³ See Memorandum on National Space Traffic Management Policy, 2018 DAILY COMP. PRES. DOC. 431 (June 18, 2018), <https://www.govinfo.gov/content/pkg/DCPD-201800431/pdf/DCPD-201800431.pdf> (SPD-3).

²⁴ Refresh Public Notice at 1-2.

²⁵ See, e.g., 73 CFR § 73.211 (FM radio power levels); 73 CFR § 73.644 (equations for determining TV power levels).

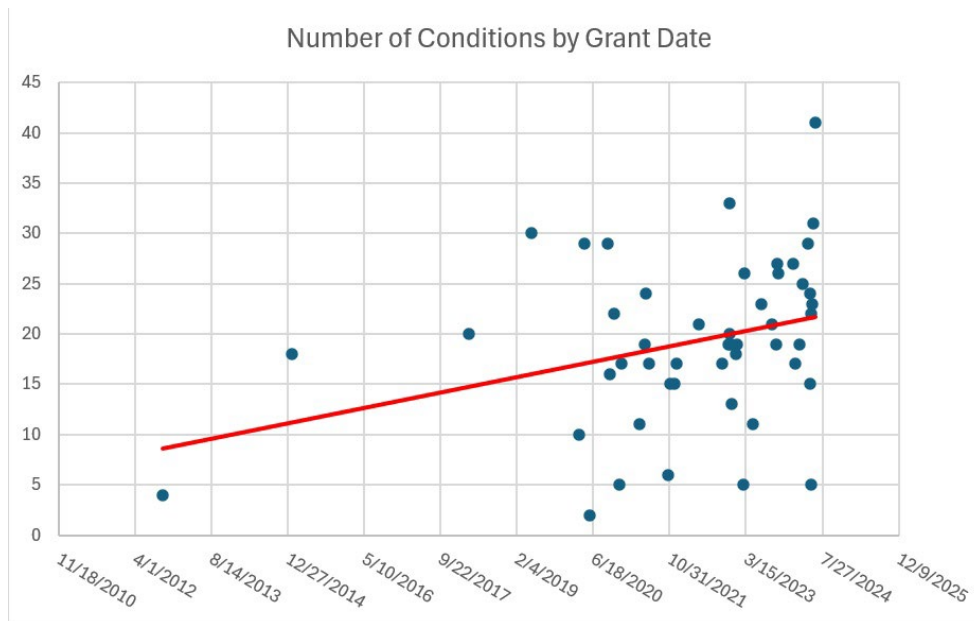
²⁶ See, e.g., 73 CFR § 73.21.

conditions, many of which reference vague rules or policies, or constitute negotiated agreements between the applicants and FCC staff to fill gaps in Commission rules.

An analogy is helpful: Currently, if I’m traveling down the interstate in my car and am pulled over by a police officer, she’ll approach the car and say: “license and registration, please.” If I’m exceeding the posted speed limit, or I have a burnt out taillight, I’ll get a warning or a ticket. Now envision a world where the officer approaches the car and says: “license, registration, and your book of conditions, please.” She retreats to her cruiser and embarks on an analysis of my condition list to determine whether my speed exceeded that condition, or whether I’m allowed to drive without taillights. That’s the world of satellite regulation in which we live.

A. Regulation by Condition Leads to “Condition Creep”

As stated above, satellite licenses seemingly are being issued with more and more conditions. The scatter plot below compares the number of conditions attached to close to fifty NGSO multi-satellite licenses issued since 2012.



The graph clearly shows an increasing trendline (in red) over the years. One would think that as the years went on, the number of conditions on licenses would decrease as the rules were honed based both on industry and Commission experience. Instead, the number of conditions has steadily climbed, with no end in sight. The Commission would do well, and industry would benefit, if bright-line rules could incorporate as many of the standard conditions as possible.

B. Regulation by Condition Can Result in “Condition Divergence,” Which is Even More Dangerous

The increasing use of conditions is bad enough. What is worse, however, is when the Commission doesn’t consistently apply the same conditions to similarly situated applicants. Below is a list of conditions imposed on a variety of satellite licensees compiled by SpaceX and submitted as part of an ex parte submission in this proceeding.²⁷

ATTACHMENT B

NGSO Authorizations Granted for Systems with >1 Satellite (Gen2 and Post-1/17/2023)

Operator	Date Granted	Satellite Count	Altitudes	Semi-Annual Reports	100 Object-Years	Communicate & Collaborate with NASA	Coordinate with NSF	Coordinate Physical Operations	Conjunction Warnings	Approval in Tranches
SpaceX	12/1/2022	7500	525-535 km	X	X	X	X	X	X	X
Amazon	2/8/2023	3232	590-630 km	X		X	X	X	X	
Space Norway	2/23/2023	2	43536 x 8076 km					X		X
Momentus	2/27/2023	4	480-535 km					X	X	
ICEYE	3/6/2023	2	530-550 km					X	X	X
Capella	6/23/2023	2	585-640 km					X	X	
ICEYE	8/31/2023	8	550 km	X	X	X	X	X	X	
Planet Labs	9/1/2023	7	350-720 km	X	X	X	X	X	X	X
Umbra Lab	10/5/2023	2	505-535 km					X	X	
Spire	1/16/2024	3	525 km						X	
Muon Space	1/30/2024	2	200-575 km					X	X	
Lynk	2/23/2024	10	479-550 km					X	X	
Amazon	3/8/2024	3232	590-630 km	X		X	X	X	X	X
HawkEye360	3/13/2024	6	475-615 km	X	X	X	X	X	X	X
Capella Space	3/15/2024	2	550-630 km					X	X	
Amazon	4/5/2024	3232	590-630 km	X		X	X	X	X	
Amazon	4/22/2024	3232	590-630 km	X		X	X	X	X	
Maxar	5/10/2024	12	450-870 km						X	
Planet Labs	5/10/2024	2	402-435 km	X	X	X	X	X	X	X
Iridium	5/16/2024	14	615-780 km					X	X	
Tomorrow.io	5/17/2024	4	500-600 km	X	X	X	X	X	X	X

²⁷ Letter from David Goldman, Vice President Satellite Pol’y, Space Expl. Tech. Corp., to Marlene Dortch, Sec., Fed. Comm’ns Comm’n (May 23, 2024), <https://www.fcc.gov/ecfs/document/10523697220317/1>.

It shows a variety of different conditions being placed on satellite operators. TechFreedom has not independently verified this chart. It is submitted only to demonstrate that, if true, the Commission is imposing inconsistent conditions on satellite systems without a discernable framework. At best, this leads to confusion. At worse, it creates a system of winners and losers, and encourages applicants to negotiate with Commission staff over which conditions to apply to their license. It also encourages competitors to file against each other, each seeking to minimize their own conditional burdens, while hamstringing competitors with the longest list of conditions possible.²⁸ This creates needless administrative litigation.

Moreover, the legal status of these conditions, and whether a licensee can challenge its differential treatment, are far from clear. Putting aside for the moment what may happen to the level of deference the Commission will receive after the legal dust settles after *Loper Bright*, even with full *Chevron* deference, it is unclear under current precedent how courts would address an appeal by a satellite licensee. The Commission, of course, has wide latitude in reaching its decisions.²⁹ But it must provide an adequate justification for the decisions it makes as between similarly situated parties:

[A]n agency must provide an adequate explanation before it treats similarly situated parties differently. This rule was developed to prevent an agency

²⁸ See, e.g., Application for Review of SpaceX in re Kuiper Systems, LLC, ICFS File Nos. SAT-MOD-20210806-00095 and SAT-AMD-20230329-00067, Call Sign: S3051, filed May 22, 2024 (seeking review of the lack of an “Orbit Years” condition being placed on the Kuiper NGSO system). TechFreedom takes no position on this proceeding. It cites to it only to highlight both the fact that conditions are not consistently being applied across all satellite licensees, and how this lack of consistency creates protracted administrative litigation.

²⁹ See *Greater Bos. Television Corp. v. Fed. Commc’ns Comm’n*, 444 F.2d 841, 851 (D.C. Cir. 1970) (“Assuming consistency with law and the legislative mandate, the agency has latitude not merely to find facts and make judgments, but also to select the policies deemed in the public interest.”); see also *Fed. Commc’ns Comm’n v. WNCN Listeners Guild*, 450 U.S. 582, 596 (1981) (courts give FCC substantial deference to “the Commission’s judgment regarding how the public interest is best served.”).

from, inter alia, “vacillat[ing] without reason in its application of a statute or the implementing regulations.”³⁰

Most likely, the Commission will argue that satellite licensees are not similarly situated, especially here where they are not directly competing with each other over a single license.³¹

It will also argue that it has wide latitude to impose conditions on some licensees within a spectrum band and not others. In *Mobile Relay Assocs. v. F.C.C.*,³² licensees in the 800 MHz band challenged the conditions on their licenses as being different from those of other licensees. The appellate court responded:

We have previously declared that if the Commission is “fostering innovative methods of exploiting the spectrum,” it “functions as a policymaker” and is “accorded the greatest deference by a reviewing court.” We uphold the Commission if it makes a “technical judgment” that is supported “with even a modicum of reasoned analysis,” “absent highly persuasive evidence to the contrary.”³³

Courts have even concluded that parties are differently situated merely by having a different number of facilities.³⁴ At some point, however, treating every applicant as *sui generis* leads to an incomprehensible regulatory system where conditions are based on what the regulator had for breakfast. This inevitably leads to the Commission choosing winners and losers rather than applying a uniform set of rules to all applicants.

³⁰ *Chadmoore Commc’ns, Inc. v. Fed. Commc’ns Comm’n*, 113 F.3d 235 (D.C. Cir. 1997) (quoting *New Orleans Channel 20, Inc. v. Fed. Commc’ns Comm’n*, 830 F.2d 361, 366 (D.C. Cir. 1987)).

³¹ *See Ashbacker Radio Co. v. Fed. Commc’ns Comm’n*, 326 U.S. 327, 330 (1945).

³² 457 F.3d 1 (D.C. Cir. 2006).

³³ *Id.* at 362 (quoting *Teledesic LLC v. Fed. Commc’ns Comm’n*, 275 F.3d 75, 84 (D.C. Cir. 2001)).

³⁴ *See Chadmoore*, 113 F.3d at 238 (“CII’s application covered 2,312 stations in twenty-six states while the others’ were limited, respectively, to eleven stations in four states and four stations in two states.”).

The horrible consequences of this approach are best exemplified by the FCC's experience with the Pioneer's Preference. Preferences awarded based on the level of technical innovation increasingly turned on nearly incomprehensible analyses of minute differences between technologies.³⁵ Ultimately Congress stepped in and abolished the Pioneer's Preference by statute.³⁶

In short, this Chinese Menu of conditions doesn't lead to a good meal. Instead, the Commission should use this proceeding to both harmonize the conditions it applies across all licenses and seek to establish rules which codify, to the extent practicable, the conditions it routinely imposes on satellite licenses. Doing both of these will lead to a simpler, faster, more coherent, and less contentious licensing process—something the rapidly evolving space economy so desperately needs.

III. The Commission Rule That NEPA Does Not Apply to Outer Space

If the goals of this proceeding are to provide clarity and certainty for licensees, as well as to speed the licensing process, the FCC should once and for all make clear that the National Environmental Policy Act (NEPA) does not apply to outer space, and that opponents of specific systems, and commercial space activities in general, cannot weaponize NEPA to stop or slow down innovative uses of outer space. Twice now, FCC grants of satellite licenses have

³⁵ See, e.g., Peter Passell, *THE MEDIA BUSINESS; F.C.C. 'Pioneer' Policy Under Attack*, N.Y. TIMES (Jan. 31, 1994), <https://www.nytimes.com/1994/01/31/business/the-media-business-fcc-pioneer-policy-under-attack.html> ("The rationale has been challenged by a number of competitors, and often in language that betrays the frustration of companies that may now be forced to bid for a single broad band of spectrum in three key markets.").

³⁶ See Balanced Budget Act of 1997, Pub. L. 105-33, 111 Stat. 251 (1997); 47 U.S.C. § 309(j)(13); see also Commission Terminates Pioneer's Preference Program; Dismisses All Pending Pioneer's Preference Requests, FCC Report No. ET 97-7 (Sept. 4, 1997), https://transition.fcc.gov/Bureaus/Engineering_Technology/News_Releases/1997/nret7012.html.

been challenged based on a claim that the Commission has failed to conduct a proper environmental review. First, in 2021 the Commission authorized SpaceX to lower the orbit of a number of its Starlink satellites.³⁷ Viasat and DISH, among others, challenged this decision on various grounds. Several appellants also argued that the Commission erred in failing to conduct a full environmental assessment. In the SpaceX Second Modification Order, the Commission said:

As a threshold matter, we note that it is not clear that all of the issues raised by these parties are within the scope of NEPA or related to our action in approving SpaceX's Third Modification application. We further observe that several of the issues presented to the Commission raise novel questions about the scope of NEPA, including whether NEPA covers sunlight as a source of "light pollution" when reflecting on a surface that is in space. We note that NEPA is a procedural statute intended to ensure that Federal agencies consider the environmental impacts of their actions in the decision-making process. We find that we do not need to evaluate and determine whether NEPA applies to the novel issues raised by Viasat and The Balance Group in order to act on SpaceX's application. Instead, for purposes of our analysis, and out of an abundance of caution, we will assume that NEPA may apply and consider the concerns raised in the record before us under the standard set forth in section 1.1307(c) of our rules.³⁸

The DC Circuit affirmed the Commission's decision and rejected the environmental claims, but on purely standing grounds, finding that the injury Viasat alleged was purely

³⁷ In re Space Exploration Holdings, LLC, 36 FCC Rcd. 7995 (2021) (SpaceX Second Modification Order), *aff'd sub. nom.* Viasat v. Fed. Commc'ns Comm'n, 47 F.4th 769 (D.C. Cir. 2022).

³⁸ *Id.* ¶ 77.

economic and thus not covered by NEPA,³⁹ and that The Balance Group had failed to establish Article III standing to challenge the decision.⁴⁰

Again in 2022, the FCC approved a further modification of the Starlink system for its second generation satellites, over objections that the Commission should have done a full environmental review.⁴¹ And again, the FCC ducked the NEPA issue:

In addressing the concerns raised, we follow the approach in the SpaceX Third Modification Order, wherein we analyzed whether the preparation of an EA would be required pursuant to our rules, without deciding the novel issue of NEPA's scope vis-à-vis space activities. We conclude that an EIS is not required in connection with this particular licensing action, and that SpaceX is not required to prepare an EA prior to our taking action in this partial grant.⁴²

This time, a group called The International Dark-Sky Association appealed to the DC Circuit.⁴³ Oral argument was held on December 11, 2023,⁴⁴ and as of the filing of these comments, the case remains pending. In both cases, TechFreedom filed amicus briefs urging

³⁹ *Viasat v. FCC*, 47 F.4th at 780 (“We do not question that space congestion attributable to SpaceX may impose economic costs on Viasat itself. But we do not think that Viasat (or its shareholders, officers, employees, customers, suppliers, or other stakeholders) can fairly be described as having personally suffered a nuisance, aesthetic, or other environmental injury from congestion in outer space.”).

⁴⁰ *Id.* at 782 (“Again, we are left with no basis to determine whether the requisite elements of standing have been met—an issue on which the Group bore the burden of proof.”).

⁴¹ FED. COMM'NS COMM'N, 37 FCC Rcd. 14822, SPACE EXPLORATION HOLDINGS, LLC, REQUEST FOR ORBITAL DEPLOYMENT AND OPERATING AUTHORITY FOR THE SPACEX GEN2 NGSO SATELLITE SYSTEM (2022).

⁴² *Id.* ¶ 103.

⁴³ *Int'l Dark-Sky Ass'n, Inc. v. Fed. Commc'ns Comm'n*, No. 22-1337 (D.C. Cir. Ct. App. 2023).

⁴⁴ Oral Argument, *Int'l Dark-Sky Ass'n, Inc. v. Fed. Commc'ns Comm'n*, No. 22-1337 (D.C. Cir. Ct. App. 2023), <https://www.courtlistener.com/audio/89415/international-dark-sky-association-inc-v-fcc/>.

the DC Circuit to rule that NEPA does not apply to outer space.⁴⁵ For the reasons set forth below, the Commission should firmly declare that NEPA indeed does not apply to its satellite license application reviews. To do otherwise will invite continued and protracted litigation on this issue, which has been raised by several parties in this proceeding.⁴⁶ Some of their comments argue that since other federal agencies are not doing enough to protect the environment, writ large,⁴⁷ the FCC should fill the gap and promulgate rules requiring extensive, indeed exhaustive and exhausting, environmental review of space activities.⁴⁸ Weaponizing NEPA has become a tool of both competitors and those seeking to slow down or stop innovative uses of space. Now is the time to shelve this tool.⁴⁹ As the following analysis shows, to the extent these commenters seek to have federal agencies police the

⁴⁵ Brief for TechFreedom as Amicus Curiae Supporting Fed. Commc'ns Comm'n, *The International Dark-Sky Association, Inc. v. Fed. Commc'ns Comm'n*, No. 22-1337 (D.C. Cir. Ct. App. 2023), <https://techfreedom.org/wp-content/uploads/2023/06/TF-22-1337-International-Dark-Sky-Association-Inc.-v.-FCC.pdf>; Brief for TechFreedom as Amicus Curiae Supporting Respondent, *Viasat, Inc. v. Fed. Commc'ns Comm'n*, 47 F.4th 769 (D.C. Cir. 2022) (No. 21-1123), <https://techfreedom.org/wp-content/uploads/2021/09/File-Stamped-TechFreedom-Amicus-Brief-Viasat-v-FCC.pdf>.

⁴⁶ See, e.g., Comments of the Outer Space Institute (OSI) (May 31, 2024); Ex parte filing of Viasat (Feb. 12, 2021); Comments of Mudd Law (Oct. 9, 2020); Comments of Public Employees for Environmental Responsibility (Nov. 19, 2018).

⁴⁷ See Comments of Charles Mudd at 2 ("Earth's orbital space should be considered an integral part of the Earth's environment.") (footnote omitted).

⁴⁸ See, e.g., Comments of Public Employees for Environmental Responsibility at 8-9 (FAA payload review procedures are insufficient to protect the environment); OSI Comments at 2 ("Since this risk is currently not being addressed by any other US department or agency, the FCC should study the issue and be prepared to impose suitable mitigations.").

⁴⁹ Much of the remainder of this section comes from our briefs in *Viasat v. FCC* and *The International Dark-Sky International v. FCC*. The undersigned wishes to acknowledge the work done by my colleague Corbin Barthold on those briefs. It is important that we place this analysis in the record of this proceeding so that the Commission can settle this issue at the agency level, once and for all.

space environment, they must seek a change in the substantive environmental statutes, not use a policy and procedural law as a regulatory wet blanket.

A. Statutes Are Presumed Not to Apply Extraterritorially

“It is a longstanding principle of American law that legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States.”⁵⁰ A court is to “presume,” in other words, “that statutes do not apply extraterritorially[.]”⁵¹ What this means, in concrete terms, is that “absent *clearly expressed* congressional intent to the contrary, federal laws will be construed to have only domestic application.”⁵² Any “lingering doubt” should be “resolved” against extraterritoriality.⁵³

To understand just how “clearly expressed” the “congressional intent” in favor of extraterritoriality must be, consider *Argentine Republic v. Amerada Hess Shipping*.⁵⁴ The statute at issue there said it applied in “territory and waters, continental and insular, subject to the jurisdiction of the United States.”⁵⁵ *Amerada Hess* holds that this language does not encompass the high seas, even though the high seas are “waters” potentially “subject to the jurisdiction of the United States.”⁵⁶ “When it desires to do so,” *Amerada Hess* concludes, “Congress knows how to place the high seas within the jurisdictional reach of a statute.”⁵⁷

⁵⁰ Equal Employment Opportunity Comm’n v. Arabian Am. Oil Co., 499 U.S. 244, 248 (1991).

⁵¹ Hernandez v. Mesa, 140 S. Ct. 735, 747 (2020).

⁵² RJR Nabisco, Inc. v. Euro. Cmty., 136 S. Ct. 2090, 2100 (2016) (emphasis added).

⁵³ Smith v. United States, 507 U.S. 197, 203-04 (1993).

⁵⁴ 488 U.S. 428 (1989).

⁵⁵ *Id.* at 440.

⁵⁶ *Id.*

⁵⁷ *Id.* The decision then cites laws that explicitly use the words “high seas.” *Id.* at 440 n.7.

That’s the bar for a “clearly expressed” congressional intent about extraterritoriality. And just as Congress knows how to address the “high seas” when it wants to, Congress knows how to address “space” when it wants to. After all, U.S. law extends American criminal-law jurisdiction to American-registered vehicles “used or designed for flight or navigation in space.”⁵⁸ Congress has extended U.S. patent law to outer space.⁵⁹ To apply in outer space, NEPA would need to look like these laws. It would need to refer to space explicitly. *Amerada Hess* demands as much.

B. NEPA Does Not Overcome the Presumption Against Extraterritoriality

Of course, NEPA says nothing like that. On the contrary, its text suggests at every turn that the statute is a distinctly terrestrial one. Extratextual factors, meanwhile, show that NEPA does not even apply abroad, let alone in outer space. The case law confirms it.

1. NEPA’s Text Does Not Support Applying It to Outer Space

Congress never “clearly expressed” an intent that NEPA apply abroad. On the contrary, “the intention of the NEPA Congress” is “obscure.”⁶⁰ “Although the language of NEPA indicates that Congress was concerned with the global environment and the worldwide character of environmental problems, it does not explicitly provide that its requirements are to apply extraterritorially.”⁶¹ The bottom line is that “nothing in NEPA’s

⁵⁸ 18 U.S.C. § 7(6).

⁵⁹ 35 U.S.C. § 105(a) (“Any invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States for the purposes of this title.”).

⁶⁰ *Nat’l Res. Def. Council v. Nuclear Reg. Comm’n*, 647 F.2d 1345, 1367 (D.C. Cir. 1981) (Wilkey, J., solo opinion for the court).

⁶¹ *Greenpeace USA v. Stone*, 748 F. Supp. 749 (D. Haw. 1990); *see also* 42 U.S.C. § 4332(2)(F).

language suggests Congress intended NEPA to apply outside United States territory.”⁶² And if NEPA says “nothing” about applying “outside United States territory,” all the more does it say nothing about applying in outer space.

2. Congress Understood the Unique Nature of Outer Space in 1969

The absence of any explicit statutory reference to outer space is especially telling given when NEPA was passed. President Nixon signed NEPA into law on January 1, 1970, almost a decade after the United States first launched a person into orbit, and just a few months after the Apollo 11 Moon landing. At no time in American history has Congress been more aware of outer space. Congress debated NEPA just two years after the Senate ratified the Outer Space Treaty. So important was that treaty that President Johnson coaxed a sitting Supreme Court justice, Arthur Goldberg, into retiring from the bench to negotiate it.⁶³ Clearly Congress was aware of advances in space, and it could easily have expressed a desire for NEPA to apply there.

What Congress could have done with NEPA is particularly instructive. It could have used that legislative opportunity, just two years after U.S. ratification of the OST, to domestically execute the general non-contamination provision of Article IX of the OST.⁶⁴ It

⁶² Consejo de Desarrollo Economico de Mexicali, AC v. United States, 438 F. Supp. 2d 1207, 1234 (D. Nev. 2006).

⁶³ See WALTER A. McDOUGALL, ...THE HEAVENS AND THE EARTH: A POLITICAL HISTORY OF THE SPACE AGE 415-18 (1985).

⁶⁴ OST art. IX (“States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose.”).

would have been quite simple for Congress to cite to the OST in NEPA and declare that it should apply to U.S. exploration and use of space. Yet it didn't.

If anything, NEPA is emphatic that it does *not* apply in space. It tells the federal government to take a “systemic” approach to making decisions that “may have an impact on *man’s environment*.”⁶⁵ It requires that reports be prepared on the impact of “major Federal actions significantly affecting the quality of the *human environment*.”⁶⁶ And it says that one of its purposes is to protect “the environment and biosphere.”⁶⁷ And while it may be true that the Earth and its orbital space share a connection, physics dictates that all of the solar system is connected via the gravitational forces that interplay between the sun and the planets, effectively putting all of outer space within the control of the U.S. government. Space, though, is not part of the biosphere—i.e., the places on Earth that can sustain life.⁶⁸ NEPA must be given a constrained territorial scope—not one expanded by inventive inferences.

Note, too, that NEPA talks of coordination specifically among “Federal, State, and local agencies.”⁶⁹ The failure to mention coordination with foreign governments or international agencies is a clear sign that NEPA does not apply abroad, let alone in space.⁷⁰ If “waters” could not encompass the high seas in *Amerada Hess*, “human environment” surely cannot encompass satellite orbits.

⁶⁵ 42 U.S.C. § 4332(2)(A) (emphasis added).

⁶⁶ *Id.* § 4332(2)(C) (emphasis added).

⁶⁷ *Id.* § 4331.

⁶⁸ See *Biosphere*, NATIONAL GEOGRAPHIC: EDUCATION (Oct. 19, 2023), <https://education.nationalgeographic.org/resource/biosphere/>.

⁶⁹ *Id.* § 4332(2)(C)(v).

⁷⁰ See *Consejo de Desarrollo Economico de Mexicali, AC v. United States*, 438 F. Supp. 2d 1207, 1234 (D. Nev. 2006).

3. Other Factors Support the Argument That NEPA Does Not Apply to Space

Even if Congress generally wants a statute to apply abroad, there are at least two ways that that desire can be thwarted, or paused, in individual instances. One arises when Congress lacks control over the place where a party seeks to apply federal law. The other arises when American foreign policy is at play. If either of these factors is present, a court is not to apply our law abroad. Both are present here.

a. Lack of Congressional Control of the “Territory” of Outer Space

“United States law governs domestically but does not rule the world.”⁷¹ “In a case of doubt,” therefore, a statute should be construed “as intended to be confined in its operation and effect to the territorial limits over which the lawmaker has general and legitimate power.”⁷² American law, in other words, should be presumed to apply only where America is sovereign. The United States does not possess sovereignty over outer space. Other nations are free to enter and operate there, including in ways our nation doesn’t approve of. Indeed, productive space projects that we try to block are likely to occur, sooner or later, with some other country’s blessing.⁷³

In matters of environmental law, America lacks control over space as a matter of fact; it has actively disclaimed such control as a matter of international law. Several treaties fill the space (as it were). The main such authority is the Outer Space Treaty, which 115

⁷¹ *Microsoft Corp. v. AT&T Corp.*, 550 U.S. 437, 454 (2007).

⁷² *N.Y. Cent. R.R. Co. v. Chisholm*, 268 U.S. 29, 31-32 (1925).

⁷³ See Dunstan, *supra* note 11 (discussing a company’s acquisition of a “flag of convenience” satellite license from Papua New Guinea).

countries have joined.⁷⁴ “Outer space,” the treaty says, “is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”⁷⁵ By commanding that outer space remain sovereignless, the treaty confirms that Congress lacks legislative control there.

It is true that, under the Outer Space Treaty, nations “retain jurisdiction and control” over the objects and persons they send into space.⁷⁶ This is not the same, however, as having control over a territory for the purpose of analyzing whether a statute applies to outer space. Congress doubtless can regulate American ships; that does not mean it controls the high seas.⁷⁷ The Antarctic Treaty says that visitors to that continent remain “subject to the jurisdiction” of their respective nations;⁷⁸ that does not mean Congress controls Antarctica.⁷⁹ The question is not whether Congress could extend NEPA to American space objects. It could try, if it really wanted to, as discussed above. The question, rather, is whether Congress is *sovereign* in space. Because it isn’t—as other articles of the Outer Space Treaty confirm—NEPA, to apply in space, would have to say in the clearest possible terms that it does so. As we’ve seen, NEPA does no such thing.⁸⁰

⁷⁴ OST.

⁷⁵ OST art. II.

⁷⁶ OST art. VIII.

⁷⁷ See *Basel Action Network v. Maritime Admin.*, 370 F. Supp. 2d 57, 72 (D.D.C. 2005).

⁷⁸ Antarctic Treaty art. VIII, Dec. 1, 1959, 12 U.S.T. 794, 402 U.N.T.S. 71.

⁷⁹ *Smith v. United States*, 507 U.S. 197 (1993).

⁸⁰ That is not to say that space is without rules. A nation that joins the Outer Space Treaty is liable to other treaty-joining nations for launching, or hosting a launch, into space of an object that causes damage to any of those other nations. OST art. VII. Indeed, this principle of responsibility for one’s own launches has a treaty unto itself—the Liability Convention. Convention on International

b. Foreign Policy Considerations

Among its other important functions, the presumption against extraterritoriality helps “ensure that the Judiciary does not erroneously adopt an interpretation of U.S. law that carries foreign policy consequences not clearly intended by the political branches.”⁸¹ The “foreign policy consequences” that Congress was willing to generate in passing NEPA are anything but “clear.”⁸² It could be said, in fact, that to apply NEPA abroad is almost always to walk into a foreign-policy minefield. Consider Judge Wilkey’s opinion in *NRDC v. Nuclear Regulatory Commission*.⁸³ At issue was whether NEPA applied to the export of nuclear materials from the United States to the Philippines. Although Congress is doubtless concerned about the environment, observed Judge Wilkey, it also has other, counterbalancing interests, among them a “desire to enable American businesses and consequently the American economy to reap the benefits of sales of nuclear reactors and nuclear components.”⁸⁴ And the flipside of Congress’s desire to enable the sale of nuclear material abroad, of course, is foreign countries’ desire to buy that material. Are our nation’s courts to tell those countries how to balance the needs of the environment with their need

Liability for Damage Caused by Space Objects, Mar. 29, 1971, 24 U.S.T. 2389, 961 U.N.T.S. 13810. Under the Liability Convention, a treaty nation is absolutely liable to another treaty nation for the damage caused, by one of its space objects, to people or property on Earth or in the air. *Id.* arts. I, II. Liability among treaty-joining nations for collisions in space, meanwhile, is to be resolved according to fault. *Id.* art. III. Finally, to help ensure that these rules can be enforced, a third agreement, the Registration Convention, requires signatory nations to record the objects they launch into space with an international tracking registry. Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15.

⁸¹ *Hernandez v. Mesa*, 589 U.S. 93, 110 (2020).

⁸² *Id.*

⁸³ 647 F.2d 1345 (D.C. Cir. 1981)

⁸⁴ 647 F.2d at 1373 (discussing the Nuclear Non-Proliferation Act of 1978, 22 U.S.C. § 3201, *et seq.*).

for energy? No, this Court said. “Other cultures, other countries at diverse stages of development,” Judge Wilkey wrote, “will react in their own way” to the “global problem” of environmental protection.⁸⁵ The plaintiffs before him were not entitled to “presume that they can represent the Philippine environment” by imposing NEPA abroad.⁸⁶

The foreign-policy implications of forcing FCC applicants for satellite facilities to undergo onerous NEPA reviews cannot be overstated. Current national space policy directs the federal government to “promote the export of United States commercial space goods and services . . . for use in international markets.”⁸⁷ Among the United Nations’s Sustainable Development Goals, meanwhile, are to “significantly increase access to information and communications technology” and to “provide universal and affordable access to the Internet.”⁸⁸ As the UN notes, more than 15 percent of the world’s population—more than a billion people—lack access to a 4G network, and “the [global] rollout of mobile-broadband networks has been slowing down.”⁸⁹

U.S.-licensed NGSO constellations can provide that access. And if we don’t do it, other countries will, including China.⁹⁰ Companies such as SpaceX bring “high-speed, reliable, and

⁸⁵ *Id.* at 1367.

⁸⁶ *Id.*

⁸⁷ NATIONAL SPACE POLICY OF THE UNITED STATES OF AMERICA 1, 22 (Dec. 9, 2020), <https://spp.fas.org/eprint/nsp-2020.pdf>.

⁸⁸ UNITED NATIONS, DEP’T ECONOMIC & SOCIAL AFFAIRS, SUSTAINABLE DEVELOPMENT GOAL 9 <https://spp.fas.org/eprint/nsp-2020.pdf> (discussing “targets and indicators”) (last visited June 25, 2024).

⁸⁹ *Id.* (discussing “progress and info”).

⁹⁰ See Andrew Jones, *China establishes company to build satellite broadband megaconstellation*, SPACENEWS (May 26, 2021), <https://spacenews.com/china-establishes-company-to-build-satellite-broadband-megaconstellation/>.

affordable broadband service” to consumers “around the world, including areas underserved or currently unserved by existing networks.”⁹¹ U.S.-licensed NGSO systems could be a foreign-relations boon for the United States.

Congress presumably wants the foreign-policy benefits of American-provided satellite broadband. It presumably doesn’t want to cede those benefits to another nation, such as China. And it presumably doesn’t want private parties meddling in these foreign-policy issues by claiming to “represent” other countries’ “environment.”⁹² Nothing in NEPA unsettles any of these presumptions. And the presumptions hold even though satellite launches can conceivably create ancillary costs (*e.g.*, a small chance of falling debris) back on Earth. There is no sign in NEPA that Congress would want the mitigation of those costs to be prioritized over the acquisition of the benefits, in soft power and international good will, that could come from an American company’s providing Internet to remote and poverty-stricken regions around the world.

c. Extensive Case Law Supports the Argument That NEPA Does Not Apply to Outer Space

The case law, on the whole, confirms that NEPA should not apply extraterritorially, let alone in outer space.⁹³ Three points about these cases are worth emphasizing. First,

⁹¹ *In re Space Expl. Holdings, LLC*, 33 FCC Rcd. 3,391 ¶ 1 (2018).

⁹² *Nat. Resources Def. Council, Inc. v. Nuclear Reg. Comm’n*, 647 F.2d 1345, 1367 (D.C. Cir. 1981).

⁹³ *See, e.g.*, *Mayaguezanos por la Salud y el Ambiente v. United States*, 198 F.3d 297, 300 (1st Cir. 1999) (court “skeptical” of extraterritorial application of NEPA to uranium sale to Japan, although case decided on other grounds); *Consejo de Desarrollo Economico de Mexicali, AC v. United States*, 438 F. Supp. 2d 1207, 1235 (D. Nev. 2006) (NEPA does not apply to extraterritorial impacts of government’s work on a canal-lining project at the U.S.-Mexico border); *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 769 (2004)(similar); *Basel Action Network*, 370 F. Supp. 2d 57 (NEPA did not

domestic conduct or decision making does not necessarily trigger extraterritorial application of NEPA. In *Basel Action Network*, for example, the ships were launched from Virginia—much as most satellite systems being launched from U.S. territory—yet NEPA did not follow the ships onto the high seas. And in *NEPA Coalition of Japan and Consejo de Desarrollo*, decisions were made in the United States that had effects abroad, yet that did not mean NEPA applied to the foreign consequences of those domestic decisions.

Second, these cases reinforce the point that NEPA is not to be applied abroad if doing so might cause foreign-policy problems. Just as the Germans in *Greenpeace USA* wanted the weapons stockpile out of their country, many a nation here likely wants satellite broadband in its country. If applying NEPA to outer space could delay foreign countries' receipt of the desired good, NEPA should not be applied to outer space.⁹⁴

Third, the cases confirm that NEPA should not apply abroad when, regardless of whether it is so applied, the challenged action will happen anyway. Just as Mexico was going to use its water as it saw fit in *Consejo de Desarrollo*, and Swaziland was going to deal with its elephants as it saw fit in *Norton*, other countries are going to grant satellite licenses as

apply to the transport of decommissioned military vessels from Virginia to a shipbreaker in the United Kingdom); *NEPA Coalition of Japan v. Aspin*, 837 F. Supp. 466, 468 (D.D.C. 1993) (NEPA does not apply to certain military bases in Japan because of “long standing treaty arrangements” concerning those bases, plus “U.S. foreign policy interests” would “outweigh the benefits from preparing” one); *Greenpeace USA*, 748 F. Supp. 749, 760 (NEPA did not apply to the removal, by the military, of a weapons stockpile in Germany; it was necessary to “balance[e] the environmental goals of NEPA against the particular foreign policy concerns which federal action abroad necessarily entails.”); *Born Free USA v. Norton*, 278 F. Supp. 2d 5, 20 (D.D.C. 2003), vacated as moot, No. 03-5216, 2004 WL 180263 (D.C. Cir. Jan 21, 2004) (NEPA did not apply to the transfer of elephants from Swaziland to the United States, particularly because the federal government was “not [in] a position to control whether the elephants should be removed from the[ir] herds.”).

⁹⁴ See *NRDC*, 647 F.2d 1345 (foreign-policy value of nuclear exports counts against applying NEPA to the export process); *NATIONAL SPACE POLICY*, *supra* note 87, at 20, 22 (confirming the foreign-policy value of exporting “commercial space goods and services”).

they see fit. If NEPA delays the launch of broadband satellites from our shores, that will simply hasten their launch from elsewhere—a reality that confirms Congress’s lack of legislative control over space.⁹⁵

Granted, *Environmental Defense Fund, Inc. v. Massey* applied NEPA to a federal government plan to incinerate food waste in Antarctica.⁹⁶ But *Massey* is quite distinct from this case. Antarctica, *Massey* declares, is “an area over which the United States has a great measure of legislative control.”⁹⁷ As we’ve explained, that is not true of outer space.⁹⁸

Massey treats NEPA as a domestic statute in part on the ground that it governs “the decisionmaking processes of federal agencies,” which “take place almost exclusively in this country.”⁹⁹ But as *Basel Action Network* explains, this was only one “of the four factors relied

⁹⁵ Cf. *Public Citizen*, 541 U.S. at 767 (“Where an agency has no ability to prevent a certain effect due to its limited statutory authority over the relevant actions, the agency cannot be considered a legally relevant ‘cause’ of the effect. Hence, under NEPA . . . , the agency need not consider these effects in its EA[.]”).

⁹⁶ 986 F.2d 528 (D.C. Cir. 1993).

⁹⁷ *Id.* at 529.

⁹⁸ As we’ve also noted, it’s probably not true of Antarctica, either. *Massey* is undermined by a later Supreme Court decision, *Smith*, 507 U.S. 197, in which the justices ruled that the Federal Tort Claims Act does *not* apply in Antarctica. According to *Smith*, “Antarctica is best described as ‘an entire continent of disputed territory.’” 507 U.S. at 198 n.1 (quoting F.M. AUBURN, ANTARCTIC LAW AND POLITICS 1 (1982)). Countries’ various “sovereign claims” to Antarctica, *Smith* notes, “have all been suspended by the terms of the Antarctic Treaty.” *Id.* Much like space, therefore, Antarctica is “a sovereignless region.” *Id.* at 198. Although *Massey* says that Antarctica is “frequently analogized to outer space” on its way to *applying* American law, 986 F.2d at 529, that claim only further highlights the tension between *Massey* and *Smith*. *Massey* relies for its claim on *Beattie v. United States*, 756 F.2d 91 (D.C. Cir. 1984), which *Smith* overturns. What both *Massey* and *Beattie* fail to understand is that American law cannot be applied in an exotic place simply because that place has no sovereign. As *Smith* explains, “Congress generally legislates with domestic concerns in mind.” 507 U.S. at 1183 n.5; see also *NEPA Coalition of Japan*, 837 F. Supp. at 467 n.3 (distinguishing *Massey* as out of step with *Smith*); *Basel Action Network*, 370 F. Supp. 2d at 71 (“The power of *Massey* remains unclear in light of *Smith*[.]”); *Born Free USA*, 278 F. Supp. 2d at 20 n.3 (similar).

⁹⁹ 986 F.2d at 532.

on . . . in *Massey*.”¹⁰⁰ In declining to apply NEPA abroad, *Basel Action Network* thought it much more important that “the United States does not have legislative control over the high seas.”¹⁰¹ In addition, *Massey* concluded that the facts before it presented no weighty issues of foreign policy.¹⁰² In that way, too, is it distinguishable from both this Court’s decision in *NRDC* (involving the export of nuclear material to the Philippines) and to whether NEPA can be weaponized to kneecap U.S. companies seeking to “export” broadband to the world. Finally, even if *Massey* were on point in every other respect, it still would not be a case about outer space. Nothing in *Massey* is pertinent to whether a statute aimed at man’s environment and the biosphere governs off planet.

The case law runs strongly against the notion that NEPA applies in outer space.

C. The Practical Costs of Applying NEPA to Outer Space

This record is being refreshed precisely because of the “next-generation space race” and the need to craft “new rules” to keep pace with this highly dynamic and innovative sector of the U.S. economy. NEPA provides the perfect counterweight to speed and agility, the perfect millstone around the collective necks of space entrepreneurs, delaying license grants and imposing huge costs on applicants here while our competitors and enemies rush to catch up in commercial space.¹⁰³ It’s been argued that NEPA “doesn’t actually privilege environmental protection”; that, “like any procedural requirement, it privileges the status

¹⁰⁰ 370 F. Supp. 2d at 72.

¹⁰¹ *Id.*; see also *Consejo de Desarrollo Economico de Mexicali, AC v. United States*, 438 F. Supp. 2d 1207, 1235-38 (D. Nev. 2006) (declining to apply NEPA abroad in a case that clearly involved domestic decisionmaking).

¹⁰² 986 F.2d at 535.

¹⁰³ See, e.g., Jerusalem Demsas, *Why does it cost so much to build things in America?*, Vox (June 28, 2021), <https://www.vox.com/22534714/rail-roads-infrastructure-costs-america>.

quo.”¹⁰⁴ NEPA already causes enough trouble for builders, innovators, and entrepreneurs on Earth. It doesn’t need to boldly go to the final frontier.

IV. Responses to Specific Matters Addressed in the Refresh Public Notice

We turn now to the specifics of the Refresh Public Notice, and the next steps the Commission should take in regulating the potential orbital debris caused by satellite communications stations.

A. Any Changes to the Current Orbital Debris Rules Should Prioritize Clarity and Improve Application Processing Timelines

Space is inherently international, and if we do not provide a practical regulatory system that can quickly and economically authorize and supervise the activities of U.S. nationals in space (a “frictionless regulatory system”),¹⁰⁵ two things will happen: First, and we’re already seeing this, U.S. domestic companies will simply move offshore and find a country that will quickly and cheaply grant them authorization for their outer space activities in exchange for license fees or taxes—fees and taxes that are thus pulled out of the U.S. economy. Second, the existing regulatory scheme, and any future regulatory scheme which is characterized by high degrees of friction, slows down the U.S. space economy, and thus advances the interests of our adversaries, including China, who do not share our democratic principles, and who wish to export their ideals into space, to our direct detriment.

¹⁰⁴ Eli Dourado, *Why are we so slow today? Five amazing facts about environmental review*, THE BENCHMARK (Mar. 20, 2020), <https://medium.com/cgo-benchmark/why-are-we-so-slow-today-c34dad4d2bff>.

¹⁰⁵ See *Continuing U.S. Leadership in Commercial Space at Home & Abroad: Hearing Before the H. Comm. on Space, Sci., & Tech.*, at 3, 118th Cong. (2023), <https://techfreedom.org/wp-content/uploads/2023/07/Space-Governance-Testimony-July-13-2023.pdf> (written testimony of J. Dunstan).

In contemplating changes to its orbital debris regulations, therefore, the Commission must keep this in clear focus. Unlike with other domestic agency regulations, where regulated entities are stuck with whatever rules an agency promulgates (unless they can successfully challenge them in court), when it comes to space, the FCC is in competition with every other country's regulatory system, something it has never had to do. Hence, "clarity" and "speed" should be the watchwords of this proceeding.

B. The Commission Should Establish Bright-Line Rules Where It Can

The Refresh Public Notice seeks additional comments on whether the Commission should establish bright-line rules or safe harbors for satellite applicants related to orbital debris.¹⁰⁶ The answers are "yes" and "yes." Where possible, the Commission should seek to establish bright-line rules. Some already exist.¹⁰⁷ But other subsections of Section 5.64 often require lengthy narrative showings.¹⁰⁸ To the extent possible, the Commission should strive

¹⁰⁶ Refresh Public Notice at 2-3.

¹⁰⁷ See, e.g., 47 CFR § 5.64 (b)(4)(i)(A) (applicants must include a "A demonstration that the space station operator has assessed and limited the probability of collision between any space station of the system and other large objects (10 cm or larger in diameter) during the total orbital lifetime of the space station, including any de-orbit phases, to less than 0.001 (1 in 1,000)."); 47 CFR § 5.64 (b)(7)(ii) ("For space stations terminating operations in an orbit in or passing through the low-Earth orbit region below 2,000 km altitude, the statement must disclose whether the spacecraft will be disposed of either through atmospheric re-entry, specifying if direct retrieval of the spacecraft will be used. The statement must also disclose the expected time in orbit for the space station following the completion of the mission.").

¹⁰⁸ See, e.g., 47 CFR § 5.64 (b)(7)(iv)(A) ("The statement must include a demonstration that the probability of success of the chosen disposal method will be 0.9 or greater for any individual space station. For space station systems consisting of multiple space stations, the demonstration should include additional information regarding efforts to achieve a higher probability of success, with a goal, for large systems, of a probability of success for any individual space station of 0.99 or better. For space stations under paragraph (b)(7)(ii) of this section that will be terminating operations in or passing through low-Earth orbit, successful disposal is defined as atmospheric re-entry of the spacecraft within 25 years or less following completion of the mission.").

to reduce both the applicant burden and the review burden by better quantifying the nature of these showings. Moreover, consistent with its Transparency Initiative,¹⁰⁹ the Space Bureau should undertake a thorough review of its Form 312¹¹⁰ to better conform it to the rules and agency practices. The FCC has enough experience with licensing space stations, even large NGSO constellations, that Form 312 should better capture the information the Commission needs to evaluate the application. Next, the Space Bureau should develop additional templates with more detail than those currently available.¹¹¹ It would also be helpful to link directly from those templates to examples of prior application exhibits that have passed muster with the Commission.

C. The Commission Should Establish Clear Safe Harbors for Speedy Grants

Where bright-line rules are not possible, the Commission should establish safe harbors wherever possible, and make clear, in both Form 312 instructions and the templates the Space Bureau is creating, what those safe harbors are. While this will take up-front Commission resources, the review time of individual applicants, and the reduction in the number of Commission requests to applicants, would pay dividends.

In both the cases of bright-line rules and safe harbors, rules should be performance based, such as the collision probability in Section 5.64 (b)(4)(i)(A), to allow for maximum flexibility for applicants. Moreover, performance-based standards will not impede

¹⁰⁹ See *Transparency Initiative*, FED. COMMC'NS COMM'N, <https://www.fcc.gov/space/transparency-initiative> (last visited June 25, 2024).

¹¹⁰ APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS, FED. COMMC'NS COMM'N (Feb. 1998), <https://transition.fcc.gov/Forms/Form312/312Fill.pdf>.

¹¹¹ See, e.g., ORBITAL DEBRIS MITIGATION (ODM) PLAN CHECKLIST, FED. COMMC'NS COMM'N (Feb. 2024), <https://www.fcc.gov/sites/default/files/ODM%20Plan%20Checklist%20-%20Stream-lined%20Small%20Space%20Stations.pdf>.

innovation by subjecting applications for new types of satellite stations to undue regulatory friction simply because the FCC has never encountered that type of application before. Indeed, it can be argued that satellite operators eschew innovative solutions to problems simply for fear of increased processing times.

D. Object-Years Is a Rough but Useful Proxy for Long-Term Orbital Debris Danger

The Refresh Public Notice requests additional comments on whether the Commission should adopt an “Object-Year” standard for applications.¹¹² It also asks whether that metric should be 100 (i.e., the total number of years of all failed satellites of a given licensee cannot exceed 100). It further asks what should happen when the Object-Year threshold is exceeded.¹¹³ Should exceeding the threshold trigger immediate grounding of future launches,¹¹⁴ or should it instead require additional filings by the licensee to demonstrate future compliance with the Commission’s orbital debris standards? Finally, what type of reporting requirements should be applied to demonstrate compliance with the Object-Years requirement?¹¹⁵

These questions are best answered in reverse order. First, TechFreedom believes that licensees should annually submit a report (preferably via a simple new form), specifying the current Object-Years of its constellation. That form should also require a licensee to report

¹¹² Refresh Public Notice at 3 (“Object-years’ refers to the number of years each failed satellite would remain in orbit, summed across any other failed satellites that were part of the satellite system.”).

¹¹³ *Id.*

¹¹⁴ *Id.* at 4 (“should the operator be required to cease satellite deployment until the causes of the disposal failure have been identified and addressed sufficiently?”).

¹¹⁵ *Id.*

any instances where it believes that any individual satellite within a constellation will exceed the new five-year rule for deorbiting.¹¹⁶ As part of a licensee's report, the Commission should demand additional information if the licensee's Object-Years number exceeds seventy percent (70%) of the standard, and an additional narrative in the event that the Object-Years number exceeds ninety percent (90%) of the standard. In the latter case, the licensee should provide information as to the immediate actions the licensee will take to reduce the number below the 90% threshold.

TechFreedom does not believe that exceeding the Object-Years threshold should trigger an immediate cessation of launch and deployment. We can easily see a scenario where a system that is being deployed in a series of scheduled launches might suffer a calamity in a single launch and deployment that might, for a short period, result in the Object-Years threshold being exceeded. It would be expensive and possibly catastrophic to require an immediate standdown of future launches. Instead, the Commission should work closely with the licensee to determine if and when the threshold will be met. If a stand-down threshold is to be considered, we believe that it should be no lower than 125 percent of the Object-Years metric.

The 100 Object-Years standard is a simple formula that may be workable. It doesn't reverse-scale, however. 100 Object-Years spread out across a constellation of 1,000 satellites works well. But what about a much smaller constellation? What happens to a licensee of a 10 satellite system that exceeds 100 object years? Such a system at that point clearly no

¹¹⁶ See Press Release, Fed. Comm'n's Comm'n, FCC Adopts New '5-Year-Rule' For Deorbiting Satellites To Address Growing Risk Of Orbital Debris (Sept. 29, 2022), <https://www.fcc.gov/document/fcc-adopts-new-5-year-rule-deorbiting-satellites>.

longer meets the five-year decay rule. We therefore believe that in addition to Object-Years, the Commission also should add a requirement that a constellation cannot exceed ten percent (10%) of its satellites expected to exceed the five-year decay rule.

E. Longer-Term, the Object-Years Standard Should Be Augmented to Include Other Factors

For now, a 100 Object-Years Standard would be a good step, so long as it is applied uniformly across all systems.¹¹⁷ But it must be recognized that it is a crude metric that should, over time, be refined to include other factors that better reflect the actual orbital debris collision risk posed by a constellation, or indeed, an individual satellite.

1. Mass Matters

Ultimately, the great fear of orbital debris is the so-called Kessler Syndrome, where a series of orbital collisions causes a cascade of further collisions rendering an entire orbit unusable.¹¹⁸ The key factor that would drive a Kessler Syndrome event is actually the mass of satellites colliding. Generally speaking, the greater the mass of the colliding objects, the more debris will be created, each piece of debris then becoming the next piece of the cascade.¹¹⁹ To better fine-tune the Object-Year metric, the Commission should therefore

¹¹⁷ See *supra* Sec. II.B.

¹¹⁸ See Heather F. Riley, *Micrometeoroids and Orbital Debris (MMOD)*, NASA (June 14, 2016), <https://www.nasa.gov/centers-and-facilities/white-sands/micrometeoroids-and-orbital-debris-mmmod/>. For a fuller discussion of the Kessler Syndrome and its impact on international space law, see J. Dunstan, “Space Trash:” *Lessons Learned (and Ignored) from Space Law and Government*, 39 J. SPACE L. 23, 33-34 (2013).

¹¹⁹ See J. Carroll, *New Options for Orbital Debris*, NASA SPACE PORTAL (May 25, 2022), https://www.nasa.gov/wp-content/uploads/2019/10/space_portal_joe_carroll_0.pdf (discussing the various classes of debris using the colloquialisms of “cars,” “hubcaps,” and “shrapnel”).

consider a Mass-Object-Year metric, to take into account the danger larger objects pose to the orbital ecosystem.

2. Cross-Section Matters

The probability of a collision in orbit directly correlates to the object's cross-section in its velocity vector. The larger the surface area of object, especially in the direction it is traveling, the larger the chance it will collide with another object.¹²⁰ The Object-Years metric could be further refined by adding in a Cross-Section coefficient to account for the increased danger posed by large volumetric structures in orbit. The Cross-Section coefficient should probably be combined with the mass metric. One can imagine a spacecraft with a large cross-section but with a very low mass, such as a solar sail.¹²¹ Solar sails, while posing a higher collision risk because of their large cross-sections, do not risk a Kessler Syndrome event because any object colliding with the solar sail would simply rip the sail and pass on with little total debris increase.

3. Demonstrated Satellite Maneuverability Should Be Considered

Although a bit more difficult to quantify, the Object-Years metric should probably be adjusted downward for satellites that are highly maneuverable and able to avoid collisions. For example, a satellite operator with a demonstrated track record of transparency and ability to maneuver to avoid collisions should receive credit for its stewardship of Earth orbits. The Commission could consider, for example, providing a ten percent (10%)

¹²⁰ See D. Kessler, *Tools for Rule-of-Thumb Calculations For Orbital Debris*, 7 ORBITAL DEBRIS Q. NEWS 2 (July 2002), <https://orbitaldebris.jsc.nasa.gov/quarterly-news/pdfs/ODQNv7i3.pdf>.

¹²¹ See Tara Friesen, *NASA Next-Generation Solar Sail Boom Technology Ready for Launch*, NASA (Apr. 10, 2024), <https://www.nasa.gov/general/nasa-next-generation-solar-sail-boom-technology-ready-for-launch/>.

reduction of the total Object-Years calculation for an operator that can demonstrate that it is fully participating in both government and private space traffic management (STM) systems. It should receive an additional one percent (1%) reduction of the total Object-Years calculation for each successful collision avoidance maneuver it has conducted, up to a total of a ten percent (10%) reduction.

4. Orbits Matter

While the Commission has considered orbit height in a number of contexts,¹²² this analysis has been somewhat linear. The idea is that higher orbits pose greater orbital debris risks for two reasons: 1) the increased number of years an object will remain in orbit if not intentionally deorbited; and 2) an object will traverse all orbits below it in an uncontrolled decay. Indeed, the JASON advisory group¹²³ has suggested:

Due to the impacts on ground-based astronomy and concerns about debris generation and longevity, JASON’s highest priority recommendation is to

¹²² Mitigation of Orbital Debris in the New Space Age, Notice of Proposed Rulemaking and Order on Reconsideration, ¶ 89, FCC 18-159, released November 19, 2018, <https://docs.fcc.gov/public/attachments/FCC-19-159A1.pdf> (“Some unique, relevant aspects of debris include the fact that, particularly at higher orbits, the debris population will not naturally decrease with time even if no additional objects are launched into orbit, and that over time existing pieces of debris will tend to collide with other existing pieces of debris producing a “cloud” of debris which increases the likelihood of future collisions.”); Mitigation of Orbital Debris in the New Space Age, Second Report and Order, Statement of Chairwoman Jessica Rosenworcel, FCC 22-74, released September 30, 2022, <https://docs.fcc.gov/public/attachments/FCC-22-74A1.pdf> (“Since 1957 humanity has put about 10,000 satellites into the sky. More than half of those satellites are now defunct. Many of them were launched with the understanding that they were cheaper to just abandon than take out of orbit. That means that like Vanguard 1 they stay in orbit for decades, careening around our increasingly crowded skies as space junk. That’s bad because it raises the risk of collisions that harm satellites we count on, makes it harder to launch new objects into higher orbits, and even has environmental consequences back on Earth.”).

¹²³ JASON DEFENSE ADVISORY PANEL REPORTS, FED’N OF AM. SCIENTISTS (Feb. 3, 2022), <https://irp.fas.org/agency/dod/jason/>.

eliminate or highly regulate large satellite constellations in orbits higher than 600 km.¹²⁴

But orbital height is only one variable that determines the danger of orbital collision and debris creation potential for a satellite or a constellation. The other two orbital parameters impacting collision probability are: 1) Orbital inclination; and 2) how crowded the operational orbit may be.

High-inclination orbits, and especially polar orbits, pose the greatest danger of collision because satellites are much closer together as they traverse the poles.¹²⁵ Thus, a coefficient to reflect this increased risk should be added to the Object-Years calculation. A simple coefficient might be to add an additional three percent (3%) to the Object-Years calculation for every five degrees of inclination above sixty (60) degrees. A polar orbit (90 degrees inclination) would therefore see its Object-Years calculation increased by eighteen percent (18%) to account for the increased danger of operating in high-inclination orbits.

Finally, the Commission could increase (or decrease) the Object-Years calculation based on the crowding of the operational orbit of the satellite or constellation. The Commission could establish this factor based on the number of satellites in that orbit, augmented by the number of different operators in that orbit. While one can assume that a single satellite operator is able to track and operate its own constellation within an orbit, the more separate systems in the orbit, the higher the likelihood of inter-constellation collisions.

¹²⁴ GORDON LONG, THE IMPACTS OF LARGE CONSTELLATIONS OF SATELLITES 7 (2020), https://www.nsf.gov/news/special_reports/jasonreportconstellations/JSR-20-2H_The_Impacts_of_Large_Constellations_of_Satellites_508.pdf.

¹²⁵ See Dunstan, Space Trash, *supra* note 118, n.27 (“Polar orbits present the highest likelihood of ‘conjunctions’ because each satellite crosses the North and South Pole on each orbit. These ‘choke points’ above the poles increase dramatically the chances that two satellites flying at the same altitude could collide.”).

We leave it to the Commission and operators to determine the proper metric for this coefficient.

While layering on all of these coefficients might appear complex, it should be possible to develop these factors in such a way as to be readily determinable. It may be rocket science, but it's not hard rocket science. Ultimately, producing a finely tuned formula for assessing orbital debris risk will benefit both operators and the public at large.

V. Conclusion

The orbital debris problem is real. The legal problem is that Congress hasn't clearly spoken as to which federal agency should regulate orbital debris. There are "gaps" in the regulatory system. But TechFreedom believes that the statutory authority possessed by the FCC in this area is more limited than it believes (or would like). Congress needs to solve this problem. Until then, the Commission should act with regulatory humility in this area.

In licensing satellite communications systems, the Commission should strive to establish clear rules and safe harbors rather than rely on conditions attached to licenses. Those rules should include an Object-Years standard, which should be refined in future years to better reflect the actual orbital debris dangers posed by future systems.

Respectfully submitted,

_____/s/_____

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