

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)	
)	
Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems)	IB Docket No. 21-456
)	

**COMMENTS OF

OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA
CENTER FOR RURAL STRATEGIES
PUBLIC KNOWLEDGE
NEXT CENTURY CITIES
BENTON INSTITUTE FOR BROADBAND & SOCIETY
OREGON FIBER PARTNERSHIP (dba LINK OREGON)
ACCESS HUMBOLDT**

Michael Calabrese
Amir Nasr
Open Technology Institute at
New America
740 15th Street NW, Suite 900
Washington, D.C. 20005

March 25, 2022

Table of Contents

<i>I. Introduction and Summary</i>	<i>2</i>
<i>II. The Commission Should Maintain and Strengthen the Good Faith Coordination Requirement by Ensuring Access to Needed Information.....</i>	<i>4</i>
<i>III. The Commission Should Adopt a Degraded Throughput Metric as the Threshold to Determine Harmful Interference that Limits Spectrum Sharing</i>	<i>8</i>
<i>IV. The Commission Should Adopt a Sunset to Strengthen Competition</i>	<i>11</i>
<i>VI. CONCLUSION.....</i>	<i>14</i>

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)
)
Revising Spectrum Sharing Rules for Non-) IB Docket No. 21-456
Geostationary Orbit, Fixed-Satellite Service)
Systems)

**COMMENTS OF
OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA
CENTER FOR RURAL STRATEGIES
PUBLIC KNOWLEDGE
NEXT CENTURY CITIES
BENTON INSTITUTE FOR BROADBAND & SOCIETY
OREGON FIBER PARTNERSHIP (dba LINK OREGON)
ACCESS HUMBOLDT**

I. Introduction and Summary

New America’s Open Technology Institute, Public Knowledge, the Center for Rural Strategies, Next Century Cities, the Benton Institute for Broadband & Society, Oregon Fiber Partnership (dba Link Oregon), and Access Humboldt (hereinafter the “Public Interest Organizations” or “PIOs”) respectfully submit these comments in response to the Notice of Proposed Rulemaking (“NPRM”) seeking comment on rules governing burgeoning uses of non-geostationary satellite orbit, fixed-satellite service (NGSO FSS) systems.¹ The PIOs urge the Commission to adopt and enforce a good faith coordination framework that facilitates intensive spectrum sharing, market entry and competition among NGSO operators. If the Commission prioritizes earlier-licensed systems, it should require the information necessary to coordinate and in any case adopt the degradation of service metric to determine harmful interference.

¹ Order and Notice of Proposed Rulemaking, IB Docket No. 21-456, RM-11855 (rel. Dec. 15, 2021) (“NPRM”).

First, the PIOs strongly support the Commission's adoption of a rule that maintains and enforces a good faith coordination requirement among all NGSO FSS operators regardless of processing round, including information-sharing requirements that enable and encourage more intensive and efficient spectrum sharing.² Any prioritization based on processing round should be the default *only* when good faith coordination fails and not as a presumption or general rule.

Unfortunately, the Commission's proposal to default to an all-or-nothing approach that prioritizes the operator approved in an earlier processing round creates a strong incentive for that party *not* to coordinate in good faith with a competitor approved in a later round. This harms consumers and wastes spectrum. Accordingly, the Commission should also make every effort to facilitate good faith coordination by ensuring that beam pointing and other necessary technical information is available, while also protecting proprietary or competitively-sensitive information from undue disclosure or misuse.

Second, The Commission should adopt a degraded throughput metric to determine the interference threshold that would adequately protect NGSO FSS systems from harmful interference.³ The PIOs believe that limitations on spectrum sharing and use should be based on the *actual* degradation of service that a system could reasonably expect to experience, and not on an arbitrary or overly-conservative I/N limit. As the Commission has clarified in recent proceedings, operators authorized to share a band with a priority licensee should be required to mitigate interference *only* to the extent that it results in actual and significant harmful interference to the service.

Finally, to boost competition, the PIOs also recommend the Commission adopt a sunset that does not significantly exceed that of the buildout period. The Commission suggests six

² See *NPRM* at ¶ 16.

³ *NPRM* at ¶ 21.

years, which the PIOs agree is reasonable suggestion. Implementing a sunset of an appropriate length would help with combating spectrum hoarding and promote innovation and competition.

The recommendations in these comments would boost digital equity encouraging market entry and competition that could lower prices, and improve access in unserved and underserved rural, Tribal, and other less densely-populated areas in particular. This proceeding should be viewed as part of larger effort to modernize and encourage spectrum sharing, including through a use-it-or-share-it approach in 12 GHz and in other underutilized bands, with a goal of promoting widespread and equitable use of public airwaves. As the co-chairs of the Congressional Spectrum Caucus, Reps. Doris Matsui (D-CA) and Brett Guthrie (R-KY) recently wrote in a letter to Chairwoman Rosenworcel: “In addition to new coordination requirements, structural reforms to spectrum access rights and efforts to increase spectral efficiency, coupled with process reforms could support a more dynamic satellite environment.”⁴

II. The Commission Should Maintain and Strengthen the Good Faith Coordination Requirement by Ensuring Access to Needed Information

The PIOs strongly support the Commission’s adoption of a rule that maintains and enforces a good faith coordination requirement among all NGSO FSS operators regardless of processing round, including information-sharing requirements that enable and encourage more intensive and efficient spectrum sharing.⁵ Any prioritization based on processing round should be adopted as the default *only* when good faith coordination fails and not as a presumption or general rule. The PIOs agree with the Commission that “information sharing among NGSO FSS

⁴ Letter of Reps. Doris Matsui and Brett Guthrie to Federal Communications Commission Chairwoman Jessica Rosenworcel (March 14, 2022) <https://matsui.house.gov/sites/evo-subsites/matsui.house.gov/files/evo-media-document/20220314%20-%20Satellite%20nprm.pdf>.

⁵ See *NPRM* at ¶ 16.

operators is essential to their efficient use of spectrum.”⁶ Incentivizing spectrum sharing helps to boost competition, which benefits consumers by catalyzing innovation, improving affordability, and contributing to a vibrant and diverse wireless ecosystem.⁷ Accordingly, the Commission should also make every effort to facilitate good faith coordination by ensuring adequate technical information is available, while also protecting proprietary or competitively-sensitive information from undue disclosure or misuse.

Currently the Commission’s rules require NGSO FSS operators to coordinate in good faith or, if that fails, to split the spectrum equally. This default creates an incentive for coordination. Unfortunately, the Commission’s proposal to default to an all-or-nothing approach that prioritizes the operator approved in an earlier processing round creates a strong incentive for that party *not* to coordinate in good faith with a competitor approved in a later round. This harms consumers and wastes spectrum. While prioritization based on processing round may on balance be the most practical rule when good faith negotiations fail, the Commission should do everything possible – including mandatory information sharing, oversight and enforcement – to encourage operators to negotiate a coordination agreement.

The PIOs fully agree with the co-chairs of the Congressional Spectrum, Caucus, Reps. Doris Matsui (D-CA) and Brett Guthrie (R-KY), who recently stated in a letter to the Commission: “Good faith coordination should include meaningful, continuous, and flexible requirements to ensure the appropriate flow of technical information needed to achieve cooperation, and apply them among all NGSO FSS grantees, including those authorized through different processing rounds.”⁸ As a Dynamic Spectrum Alliance (DSA) report similarly noted,

⁶ *Id.* at ¶ 23.

⁷ *Id.*

⁸ Letter of Reps. Doris Matsui and Brett Guthrie to Federal Communications Commission Chairwoman Jessica Rosenworcel (March 14, 2022), available at

“complete and accurate licensing information on incumbent operations” are an “essential component of any coordination process” coupled with updates that are sufficiently often that they “capture new licensees or changed operating parameters.”⁹

The PIOs likewise agree with Kuiper’s observation in this proceeding that the “NGSO FSS environment is continuously changing and evolving as, for example, earlier round systems fail to deploy, operators undergo iterative deployment stages, and systems are modified. Without an ongoing exchange of information, operators would not have the information required to best mitigate interference.”¹⁰ Consistent with this rationale, SpaceX proposed in its Petition for Rulemaking that NGSO FSS operators provide one another with beam pointing information.¹¹ The PIOs agree with Kuiper that to the extent it facilitates coordination, beam pointing information, including ephemeris data, should be available for the specific satellites of a system that is operating with specific earth stations in specific frequency bands, as well as any other operational data necessary for coordination. This information should be provided in a timely fashion to ensure such communication can help prevent harmful interference.¹²

Our groups agree with the Commission’s proposed rule stipulating that “the good-faith coordination requirement applies among all NGSO FSS grantees, including those authorized through different processing rounds.”¹³ However, if the Commission adopts prioritization based

<https://matsui.house.gov/sites/evo-subsites/matsui.house.gov/files/evo-media-document/20220314%20-%20Satellite%20nprm.pdf>.

⁹ Dynamic Spectrum Alliance, *Automated Frequency Coordination: An Established Tool for Modern Spectrum Management*, at 13 (March 2019), available at

http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf.

¹⁰ Comments of Kuiper Systems LLC, RM-11855 (June 15, 2020), at 5 (“Comments of Kuiper”).

¹¹ Petition for Rulemaking of SpaceX, Revision of Section 25.261 of the Commission’s Rules to Increase Certainty in Spectrum Sharing Obligations Among Non-Geostationary Orbit Fixed-Satellite Service Systems (April 30, 2020), at 2 (“Petition of SpaceX”).

¹² *Comments of Kuiper* at 5-6.

¹³ *NPRM* at ¶ 16.

on processing round, we urge the Commission to balance the needs of certainty for earlier-approved systems with those of competitive entrants in a manner that spurs competition, choice and innovation in satellite services. In that respect, we agree with Amazon that “without limits on that priority, the current rules risk hampering competition and placing the promise of satellite-delivered broadband in the hands of a small group of earlier-licensed incumbents.”¹⁴ The PIOs believe that adopting prioritization for earlier-approved systems makes it more important that the Commission do everything in its power to facilitate a positive outcome to negotiations and good faith coordination. Getting this balance right is not only essential to optimizing the public interest use of these shared bands, but can also build on the Commission’s forward-thinking and world-leading efforts to promote spectrum sharing including, when necessary, reliance on spectrum database management technologies.

While we support sharing, the benefits of facilitating competition also point toward an important caveat to requiring operators to share beam pointing and other technical data needed to avoid interference: The rules must also protect all parties (including NGSO customers) from the inappropriate disclosure or use of that data for unrelated or anti-competitive purposes. Although the PIOs have generally supported as much transparency as possible for frequency coordination databases that limit access to unused spectrum (*viz.*, the TV White Space Database and the Spectrum Access Systems certified to coordinate the Citizens Broadband Radio Service), in this context the small number of licensees and the lack of open access for the public suggests that the Commission can place far stricter rules on the disclosure and use of information.

The Commission has experience protecting sensitive operational data as a means of facilitating spectrum sharing, including with respect to national security in multiple bands shared

¹⁴ Ex Parte Letter from Amazon, IB Docket No. 21-456, RM-11855 (Dec. 6, 2021), at 2 (“Amazon Ex Parte”).

by commercial licensees with U.S. military operations (e.g., in CBRS, in the 3.45-3.55 GHz band, in the AWS-3 band, and in the E-band 70/80/90 GHz Service, where a certified database coordinator ensures open commercial access does not interfere with federal operations).¹⁵ As in CBRS, one proven option is to certify a neutral, third-party clearinghouse or database provider to facilitate the anonymous and confidential sharing of proprietary or competitively-sensitive information.¹⁶

We also recognize that the increasingly dynamic nature of new and future NGSO FSS systems could make real-time or automated coordination challenging, but we nevertheless urge the Commission to find ways to facilitate good faith spectrum sharing among these systems as a means of promoting more competition, innovation and services that can help narrow the digital divide, particularly in rural, Tribal, and remote areas.

III. The Commission Should Adopt a Degraded Throughput Metric as the Threshold to Determine Harmful Interference that Limits Spectrum Sharing

The Commission should adopt a degraded throughput metric to determine the interference threshold that would adequately protect NGSO FSS systems from harmful interference.¹⁷ The PIOs believe that limitations on spectrum sharing and use should be based on the *actual* degradation of service that a system could reasonably expect to experience, and not on

¹⁵ See, e.g., Second Report and Order, *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket No. 19-348, at ¶ 53 (March 18, 2021) (“Given the classified and sensitive nature of some of the information to be shared by the DoD for effective coordination in the band, we expect that NTIA and the DoD will develop procedures, methods, and means for sharing such information (e.g., through the ‘Trusted Agent’ process”); Report and Order, *Allocation and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, WT Docket 02-146 (rel. Nov. 4, 2003).

¹⁶ See *NGSO FSS Report and Order*, at ¶ 47 (citing Ex Parte Letter from William M. Wiltshire, Counsel to SpaceX (Aug. 3, 2017), at 2-4; Ex Parte Letter from William M. Wiltshire, Counsel to SpaceX (Sept. 15, 2017)).

¹⁷ *NPRM* at ¶ 21.

an arbitrary or overly-conservative I/N limit. As the Commission has made clear in recent proceedings, operators authorized to share a band with a priority licensee should be required to mitigate interference *only* to the extent that it results in actual and significant harmful impact on service. Relying on an arbitrary or static I/N ratio, such as the Defense Department has suggested in relation to Ligado and GPS operations, is likely to leave far more spectrum capacity fallow than is necessary to prevent actual harmful interference. If two parties cannot come to an agreement, the prioritization and protection provided to an earlier-licensed system should be based on degradation of service as the best proxy for harmful interference and, ultimately, to make the most efficient use of available capacity.

The Commission’s Technological Advisory Council (TAC) explained this in its 2017 report on NGSO-to-NGSO interference and endorsed degraded throughput as an interference criteria for NGSO satellite systems.¹⁸ The TAC report stated that “spectrum management often focuses on eliminating or providing predictable bounds on the amount of potential degradation. . . . When the gap is small, the efficiency penalty associated with focusing on potential degradation is also small.”¹⁹ The report noted, however, that “[i]n the case of coexisting NGSO satellite constellations, the gap between the potential level of degradation and the amount of harmful degradation is large.”²⁰ That is, when the gap is large, so is the “efficiency penalty.”

As the Commission acknowledges in the *NPRM*, an interference metric based on throughput degradation also reflects a growing international consensus. A degraded throughput metric for the protection of GSO operations from NGSO systems is specified in Article 22.5L of

¹⁸ See FCC Technological Advisory Council, Satellite Communication Plan Working Group, *A Risk Assessment Framework for NGSO-NGSO Interference*, at 23, 27-31 (2017), available at <https://transition.fcc.gov/oet/tac/tacdocs/meeting12617/TAC-NGSO-risk-assessment-framework-v100-2017-12-06.pdf>.

¹⁹ *Id.* at 26.

²⁰ *Id.* at 26-27.

the ITU Radio Regulations and appears to be essentially the same metric proposed by Amazon for protecting earlier-round NGSO systems from later-round NGSO systems.²¹ Adopting a degradation of service metric would also be consistent with recommendations of the United States at the ITU for a “single-entry metric of a 3% increase in unavailability and a 3% allowance in the reduction of the time-averaged weighted in degraded throughput, and that some evidence supports this as a reasonable value.”²²

The Commission also took a similar approach recently to authorize more robust sharing of unused spectrum by unlicensed operation with incumbent licensees in the 6 GHz band. In its unanimous 6 GHz Order, the Commission adopted a protection regime that declined to apply a worst-case or highly restrictive limit on shared access, but instead relied on probabilistic simulations based on real-world parameters such as building-entry loss and duty cycle to arrive at an approximation of a threshold that adequately protected incumbents from actual harmful interference.²³ In its opinion upholding the Commission’s Order, the U.S. Court of Appeals for the D.C. Circuit emphatically endorsed the Commission’s approach, noting that the Commission’s obligation and goal is to *minimize* (not eliminate) the risk of harmful interference while striking a balance between competing spectrum users that is most likely to maximize the

²¹ See International Telecommunication Union, *Radio Regulations Articles, Edition of 2020*, Chapter VI – Provisions for Services and Stations, 22.5L, at 295 (2020), available at https://www.itu.int/dms_pub/itu-r/opb/reg/R-REG-RR-2020-ZPF-E.zip; see also *Amazon Ex Parte* at 4.

²² See *Updates to Working Document Towards a Preliminary Draft New Recommendation ITU-R S.[Interference-NGSO]*, Contribution to WP 4A from the United States of America, Document 4A/420-E, at 3 (Oct. 18, 2021).

²³ Report and Order and Further Notice of Proposed Rulemaking, ET Docket No. 18-295, GN Docket No. 17-183 (rel. April 24, 2020), at ¶¶ 64-65, 116 (recognizing that “any technical study pertaining to spectrum sharing should take into consideration the specific behavior of services involved and the complexity of the propagation environment where the services operate. . . . [as well as] the probability of co-channel operation.”).

overall public interest.²⁴ That same reasoning points here to a reliance on a metric that is the best proxy for *actual* harmful interference, which we agree is degradation of service.

The parties and stakeholders central to the sharing of NGSO spectrum will surely be able to offer more technical insight into the specific values for the percentage of degraded throughput that would be adequate to protect an earlier-licensed system. In weighing that input, the PIOs urge the Commission to implement a methodology that is likely to accommodate the greatest market entry and the most intensive use of the bands at issue that is consistent with protecting the service level expectations of prioritized systems. Striking this balance, potentially through a degraded throughput methodology in line with international standards and recommendations,²⁵ will be key to improving market competition and consumer benefits.

IV. The Commission Should Adopt a Sunset to Strengthen Competition

The Commission should adopt a sunset on prioritization and ensure that prioritization does not significantly exceed the buildout period.²⁶ The PIOs do not have a firm position on the specific duration, but it should be significantly less than a full 15-year license term. The Commission’ suggested sunset rule to initiate after six years—to align with the “first NGSO system deployment milestone”—would be a reasonable approach.²⁷

Adopting a sunset to prioritized licensees’ status would promote market entry, competition and innovation. We agree with SpaceX that a reasonable sunset period can “ensure

²⁴ *AT&T Services Inc. v. Federal Communications Commn*, Slip Opn No. 20-1190, at 9 (D.C. Cir. 2021), available at [https://www.cadc.uscourts.gov/internet/opinions.nsf/7658F4CE919568A7852587B900589344/\\$file/20-1190-1928330.pdf](https://www.cadc.uscourts.gov/internet/opinions.nsf/7658F4CE919568A7852587B900589344/$file/20-1190-1928330.pdf).

²⁵ See *NPRM* ¶ 21.

²⁶ *Id.* ¶ 25.

²⁷ *Id.* at ¶ 24.

protections for early-round licensees do not inadvertently lead to anti-competitive behavior that only serves to entrench incumbents.”²⁸ Kuiper similarly and correctly notes that the adoption of a sunset rule “would also be beneficial... to prevent the spectrum rights afforded prior round licensees from inhibiting new entry, provided the length of the sunset period for prior round licensees is appropriately tailored.”²⁹

V. Adoption of a Strong Framework for NGSO Sharing Would Promote Broadband Access and Equity in Unserved and Underserved Communities

The PIOs believe that the adoption of a NGSO FSS framework that facilitates and encourages coordination and spectrum sharing will promote digital equity and inclusion by increasing service availability, competition and affordability in unserved and underserved rural, Tribal, and other high-cost areas by optimizing the spectrum-as-infrastructure needed to deploy service.³⁰ By improving sharing and access to NGSO spectrum, the Commission can increase the number of providers in underserved and unserved areas of the country and lower prices for consumers. More spectrum leads to more providers, which leads to more access, representing a win-win-win policy from the Commission’s standpoint.

Improving the sharing regime of the Commission’s existing NGSO framework would combat the market realities that have led to a dominance by the nationwide carriers that have left rural and Tribal regions systemically underserved. Historically, the largest providers have gamed buildout requirements based on population to leave enormous portions of rural and small town America with limited service and fallow spectrum. The nationwide carriers have warehoused spectrum and then failed to deploy service in communities that are less profitable, while also

²⁸ *SpaceX Petition* at 13.

²⁹ *Comments of Kuiper* at 8.

³⁰ *See NPRM* ¶ 27.

rarely offering the unused spectrum to smaller ISPs to lease.³¹ The Commission is in the process of tackling this issue by creating secondary markets “incentives” for leasing and disaggregation of underused license areas. Thankfully, in this proceeding, because all NGSO FSS spectrum is shared, the Commission can engineer rules to facilitate and encourage good faith coordination based on robust information sharing among NGSO spectrum licensees, an outcome that has the greatest chance of increasing innovation, market entry and price competition in the underserved areas most adversely impacted by digital digital redlining.³²

³¹ Comments of Ruckus Wireless, GN Docket No. 12-354 (July 24, 2017), at 5 (“Further, the changes would greatly impair the formation of a dynamic secondary trading market for PAL licenses or access, due to the concentration of a smaller number of PAL licenses into the hands of a few very large companies that are not well known for making fallow licensed spectrum available to others.”).

³² *See generally* Comments of New America’s Open Technology Institute and Public Knowledge, WT Docket No. 19-38 (Feb. 28, 2022), https://ecfsapi.fcc.gov/file/103012267825848/OTI%20PK%20Secondary%20Market%20Incentive%20Comments_FinalDraft_022822.pdf.

VI. CONCLUSION

The Commission should seize upon this opportunity to promote more intensive and effective spectrum sharing, thereby facilitating greater capacity, market entry, competition and innovation among NGSO systems licensees. The changing landscape of wireless broadband to expand broadband access and adoption should be supported by policies at the Commission to promote information sharing and adopt throughput methodologies to maximize use of spectrum. Targeted changes to the Commission's existing NGSO framework should elicit strong consumer and market rewards to bridge the digital divide in an equitable manner.

Respectfully submitted,

**OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA
CENTER FOR RURAL STRATEGIES
PUBLIC KNOWLEDGE
NEXT CENTURY CITIES
BENTON INSTITUTE FOR BROADBAND & SOCIETY³³
OREGON FIBER PARTNERSHIP (dba LINK OREGON)
ACCESS HUMBOLDT**

Michael Calabrese
Amir Nasr
Open Technology Institute at
New America
740 15th Street NW, Suite 900
Washington, D.C. 20005

March 25, 2022

³³ Benton, a non-profit, operating foundation, believes that communication policy – rooted in the values of access, equity, and diversity - has the power to deliver new opportunities and strengthen communities to bridge our divides. Our goal is to bring open, affordable, high-capacity and competitive broadband to all people in the U.S. to ensure a thriving democracy. These comments reflect the institutional view of the Benton Institute for Broadband & Society, and, unless obvious from the text, is not intended to reflect the views of its individual officers, directors, or advisors.