

April 17, 2023

VIA REGULATIONS.GOV

Mr. Scott Blake Harris
Director, National Spectrum Strategy
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue NW
Washington, DC 20230

**Re: Development of a National Spectrum Strategy;
Docket No. NTIA-2023-0003; 230308-0068**

Dear Mr. Harris,

Spire Global, Inc. (“Spire”) respectfully submits these comments in response to the National Telecommunications and Information Administration’s (“NTIA”) above-referenced request for comment (“RFC”) seeking initial input on the development of a National Spectrum Strategy (“Spectrum Strategy”).¹ Specifically, Spire encourages NTIA to emphasize the importance of preserving existing Earth exploration satellite service (“EESS”) spectrum for the continuing growth and expansion of this burgeoning industry and to improve the efficiency of existing allocations through improved service rules and harmonization with the International Table of Frequency Allocations (“International Table”).

I. INTRODUCTION

Spire is a leading global provider of space-based data, analytics, and space services, offering access to unique datasets and powerful insights about the Earth from the ultimate vantage point—space—so that organizations can make decisions with confidence, accuracy, and speed. Spire’s data and analytics are used by government entities and a wide variety of commercial companies around the world to improve business operations, decrease their environmental footprint, deploy resources for growth and competitive advantage, and mitigate risk. Spire currently has contracts with a variety of U.S. government agencies, including the National Reconnaissance Office and National Aeronautics and Space Administration.

Spire has been safely deploying and operating its constellation of more than one hundred and twenty (120) EESS satellites for a decade. Spire has worked closely with the U.S. government, including the NTIA and the Federal Communications Commission (“FCC”), to license and coordinate its constellation as it has grown and evolved during this time to add additional spectrum, and deploy technological advancements and novel services through small satellite technology.²

¹ See Development of a National Spectrum Strategy, Request for Comment, 88 Fed. Reg. 16244 (Mar. 16, 2023) (“RFC”).

² See generally IBFS File Nos. SAT-MOD-20200603-00065 & SAT-MPL-20200618-00078.

All of the spectrum Spire relies on to provide its industry-leading sensing capabilities are shared with Federal users on a co-primary basis in the United States, namely in the UHF, S-, X-bands.³

In recent years, EESS operators like Spire have been expanding their service offerings to customers to include “space-as-a-service.” Space-as-a-service is a rapidly growing industry segment that not only shows great commercial promise, but also aligns perfectly with the goals of the U.S. government to ensure that scarce resources, like spectrum, are put to their most efficient use. Space-as-a-service allows operators, often with flight proven platforms and demonstrated mission management capabilities, to add customer equipment—including radios and sensors—to satellites being deployed as part of an existing satellite system. Space-as-a-service also enables satellite operators to leverage other existing on-orbit satellite systems as data relay networks via intersatellite links (“ISLs”) rather than deploying more satellites or ground stations in their own networks. These service offerings thus reduce (i) the coordination burden of increasing numbers of satellites and constellations on orbit and complex ground station networks, (ii) overall demands on spectrum, (iii) the number of individual applications and coordination requests for the U.S. government to process and (iv) the likelihood of debris or other collision risks from new or unproven spacecraft.

The RFC provides a welcome opportunity—particularly as EESS operators seek access to additional spectrum and to diversify their business models to provide space-as-a-service offerings to customers—to ensure that the Spectrum Strategy of the United States reflects the long-term needs of this exponentially, high-growth industry. Spire encourages the NTIA to work closely with the FCC in its development of the Spectrum Strategy, and to adopt a long-term strategy that streamlines regulatory burdens on operators in the shared EESS bands, provides access to much-needed additional spectrum for EESS and space-to-space services, and continues to promote innovation and responsible use of scarce resources for the benefit of all Americans.

II. THE SPECTRUM STRATEGY MUST PROTECT EXISTING EESS ALLOCATIONS

From the outset, EESS is an incredibly spectrum efficient service. Hundreds (and soon to be thousands) of EESS satellites authorized in the United States⁴ share a few gigahertz of spectrum to transmit terabytes of data across networks. This is accomplished through coordination as EESS operations do not require “always on” transmission and limit downlink transmissions to when a satellite is directly overhead of the relevant ground station. In the sections below, Spire proposes additional ways to further increase the efficient use of these spectrum bands by EESS operators and the Federal systems with whom they share.

It is therefore critical to EESS operators that the Spectrum Strategy emphasize the importance of preserving the allocations in the UHF, V, S-, X-, and Ka-bands for EESS on a

³ In the United States, Spire is authorized to operate in the 401-402 MHz (space-to-Earth), 402-403 MHz (Earth-to-space), 449.75-450.25 MHz (Earth-to-space), 2020-2025 MHz (space-to-Earth), 2025-2110 MHz (Earth-to-space), 2025-2026 MHz (space-to-space), 2200-2290 MHz (space-to-Earth), and 8025-8400 MHz (space-to-Earth). Spire is also authorized for receive-only operations in the Automatic Identification System 1-4 bands, Automatic Dependent Surveillance-Broadcast bands, GPS L1 and L2, and Galileo E1 and E5.

⁴ Including both U.S. licensed and market access.

primary basis.⁵ To preserve these bands for such use, the Spectrum Strategy should affirmatively recognize that the introduction of new mobile terrestrial allocations would be contrary to the efficient use of the bands and therefore shall be excluded from future consideration of bands for reallocation for mobile terrestrial expansion.⁶

III. THE SPECTRUM STRATEGY SHOULD SUPPORT RULES TO IMPROVE ACCESS TO SPECTRUM FOR EESS OPERATIONS BY REMOVING ARTIFICIAL BARRIERS TO EXISTING SPECTRUM RESOURCES AND HARMONIZING THE U.S. TABLE WITH INTERNATIONAL ALLOCATIONS

The Spectrum Strategy should support efforts to improve the efficiency of existing spectrum allocations, particularly in the EESS bands, and to identify additional spectrum that when incorporated into a network can improve the overall efficiency of the primary service, such as space-to-space links for data relay. Earlier this year, the FCC sought comments on a Notice of Proposed Rulemaking to modernize and streamline the satellite and earth station application process.⁷ As part of this proceeding, the FCC asked whether it should permit satellite applicants to request frequencies that did not conform with the International Table.⁸ The record in that proceeding was resoundingly in favor of this change.⁹ However, Spire took this opportunity to ask the FCC go further and take additional steps to streamline the review and authorization of certain frequency bands which are routinely granted waiver for non-conforming use in the United States. Specifically, Spire encouraged the FCC to amend the U.S. Table of Frequency Allocations (“U.S. Table”) to (1) harmonize routinely granted EESS spectrum bands—such as UHF, S-, and X-band—under a single coherent service allocation, and (2) adopt non-Federal allocations for space-to-space transmissions between satellites, both within a single system and between constellations.

But the FCC cannot make these changes unilaterally. As recognized above, the bands on which EESS operators depend are shared on a co-primary basis with Federal users, and thus simultaneous parallel changes must be made to both the Federal and non-Federal sides of the U.S. Table. Spire thus encourages NTIA to undertake a review of the common EESS bands and work with the FCC as part of the development of the Spectrum Strategy to reduce the regulatory and administrative burdens on non-Federal EESS operators seeking access to these shared bands,

⁵ EESS operates in the VHF/UHF (30 MHz-1000 MHz); S-band (2000-2290 MHz); X-band (8025-8400 MHz); Ka-band (25.5-27.0 GHz).

⁶ Spire has also joined with the EESS Operators and CSSMA to submit more detailed filings on this subject in response to the RFC.

⁷ See *Expediting Initial Processing of Satellite and Earth Station Applications*, Notice of Proposed Rulemaking, IB Docket Nos. 22-411 & 22-271, 88 Fed. Reg. 2590, FCC 22-95 (2023) (“NPRM”).

⁸ *Id.*, ¶ 1.

⁹ See, e.g., Comments of the Commercial Smallsat Spectrum Management Association, IB Docket Nos. 22-411 and 22-271, at 2 (filed Mar. 3, 2023); Comments of the Satellite Industry Association, IB Docket Nos. 22-411 and 22-271, at 10 (filed Mar. 3, 2023); Comments of Space Exploration Holdings LLC, IB Docket Nos. 22-411 and 22-271, at 25 (filed Mar. 3, 2023); Reply Comments of the EESS Operators, IB Docket Nos. 22-411 and 22-271, at 4 (filed Apr. 3, 2023).

which will further enable EESS operators to deliver innovative Earth observation and space-as-a-service offerings to Americans.

A. The Spectrum Strategy Can Increase Access and Efficient Use in Existing Allocations By Adopting Data-Agnostic Service Rules for EESS Spectrum

Unlike the fixed satellite service (“FSS”) and mobile satellite service (“MSS”) allocations, EESS spectrum is further suballocated based on the type of data being transmitted from the space station, both in the United States and internationally. This has resulted in overly rigid allocations that have not kept pace with satellite innovation and in turn creates unreasonable delay and uncertainty for EESS operators, such as Spire, when seeking authorization to provide new or modified services. It also creates unnecessary and duplicative coordination burdens for Federal stakeholders who must re-coordinate with EESS operators each time operators are required to file a modification application for a non-conforming data use. For example, Spire is authorized to transmit Automatic Identification System (“AIS”) data from its on-orbit constellation to U.S. ground stations.¹⁰ If, however, Spire wanted to transmit blockchain data—using the same spacecraft, spectrum, operating parameters, and ground stations—Spire is required to seek a modification of its system, including a waiver for the non-conforming use of EESS spectrum to transmit blockchain data. Spire’s grant would then be conditioned upon Spire re-coordinating the spectrum with interested Federal stakeholders and providing the service on a non-interference, non-protection (“NINP”) basis (despite being a task identical to its protected AIS transmission) simply because specific designations for blockchain data in the EESS have not been adopted by the United States or ITU.

This absurd outcome can be avoided by aligning the treatment of EESS services with those of other satellite allocations. By harmonizing the EESS services into a single rule category in the U.S. Table, the U.S. government can effectively eliminate the concern that novel EESS data is distinct from other EESS operations or necessitates operation on a NINP basis.¹¹ By refocusing the EESS service rules on the technical parameters necessary to share spectrum and facilitate entry—and away from rules that restrict what type of data can be transmitted within the authorized service—the U.S. government can reduce administrative burdens and provide greater operational flexibility to EESS operators without any increased risk of harmful interference to co-frequency EESS operations.¹² Thus, the Spectrum Strategy can expand access to and the efficient use of the EESS bands without causing harmful interference to incumbent systems through the adoption data-agnostic rules for services that operate within the technical parameters of an existing allocation, helping ensure that regulation in the United States can keep pace with innovation in the EESS and other satellite services.

¹⁰ See, e.g., Spire Global, Inc., Modification Application, Stamp Grant with Conditions, IBFS File Nos. SAT-MOD-20200603-00065 & SAT-AMD-20210309-00030 (Nov. 9, 2022) (granted in part, deferred in part) (“Spire ISL Grant”).

¹¹ See NPRM, ¶ 13.

¹² EESS operations that propose a service not specifically provided for in the International Table would still be subject to Art. 4.4 of the ITU Radio Regulations. ITU Radio Regulations, Art. 4.4, Edition of 2020.

B. The Spectrum Strategy Should Identify Spectrum to be Allocated for Non-Federal Space-to-Space Use

As consumers place increasing demands for the instantaneous transmission and availability of data, ISLs have become a linchpin of modern satellite network architectures. ISLs improve the spectral efficiency, safety, and sustainability of the orbital environment by enabling operators to reduce the size of their constellations by distributing capacity among the network, and by relaying information through other satellite networks, including positional data. ISLs also help meet growing customer demand for more expedient data, allowing satellite operators to relay information through space to a satellite in view of an available ground station, rather than having to build out larger, more complex (and often under-utilized) ground infrastructure to always be in view of the satellites overhead. Unfortunately, the United States has not allocated any spectrum for non-Federal EESS ISLs, even in bands that are otherwise globally harmonized and allocated for Federal space-to-space use in the United States.¹³

Currently, operators seeking to provide ISLs in the United States must do so on a non-conforming basis by seeking a waiver of the U.S. Table and pre-coordinating with the U.S. government stakeholder agencies (NASA, NOAA, and Air Force/Space Force). This process is long and arduous, introduces excessive delay and uncertainty into the regulatory process, and often results in suboptimal outcomes for commercial operators. For example, in 2020, Spire submitted a modification application to the FCC seeking to add, among other things, ISL in the 2025-2110 MHz and 2200-2290 MHz band to its constellation.¹⁴ Since these S-band frequencies are shared with Federal users, and non-Federal space-to-space operations are non-conforming in the United States, Spire was required to pre-coordinate the requested use with the U.S. government agency stakeholders prior to receiving a grant. After two years of coordination, the parties were able to reach agreement on 1 MHz of spectrum for Spire to utilize for ISLs between 2025-2026 MHz.¹⁵ While the 1 MHz of coordinated spectrum allows Spire to begin deploying an ISL data relay among its spacecraft, the amount of spectrum ultimately authorized is substantially less than what was sought and requires Spire to continue in the regulatory process indefinitely in order to obtain access to the bandwidth needed to provide the intended service to its customers.

The Spectrum Strategy should seek to remedy this deficit in critical allocations and work with the FCC to make spectrum available for non-Federal space-to-space operations. First, the Spectrum Strategy should support adding an allocation for non-Federal EESS space-to-space use in the 2025-2110 MHz and 2200-2290 MHz band consistent with globally harmonized allocations and subject to coordination with Federal users.¹⁶ Second, the Spectrum Strategy should commit

¹³ See 47 C.F.R. § 2.106.

¹⁴ See Spire Global, Inc., Application to Modify SAT-LOA-20151123-00078, SAT-AMD-20180102-00001, SAT-PDR-20190321-00018, IBFS File Nos. SAT-MOD-20200603-00065 & SAT-MPL-20200618-00078 (filed June 3, 2020).

¹⁵ See Letter from Ananda Martin, General Counsel, Spire Global, Inc. to Marlene H. Dortch, Secretary, FCC, IBFS File Nos. SAT-MOD-20200603-00065, SAT-MPL-20200618-00078, SAT-AMD20210309-00030 & SAT-APL-20210309-00031 (June 21, 2022); see also Spire ISL Grant at Condition 16.

¹⁶ These bands are currently allocated for EESS, Space Operations, and Space Research (space-to-space) both for Federal use and internationally across all three regions. See 47 C.F.R. § 2.106.

NTIA and the FCC to identify additional frequencies that can be allocated for ISL use by both EESS and other satellite services. Finally, the Spectrum Strategy should support an interim provision wherein EESS operators may seek authorization for, and Federal users will coordinate, space-to-space communications in bands currently allocated for non-Federal EESS and Space Operations where the applicant can demonstrate that (1) such operations will cause no more interference than similar Earth-to-space or space-to-Earth operations in the same bands, and (2) where appropriate, that such operations will conform with Art. 4.4 of the ITU Radio Regulations. Making ISLs more readily available for use in satellite networks will help increase spectral efficiency, encourage greater utilization of existing resources on-orbit, and potentially reduce the size of constellations, thereby achieving overall improvements to the efficiency and safety of the orbital operating environment consistent with U.S. government objectives.

IV. THE SPECTRUM STRATEGY CAN ENCOURAGE EFFICIENT USE OF SPECTRUM THROUGH HARMONIZATION WITH THE INTERNATIONAL TABLE AND REDUCED ADMINISTRATIVE BURDENS ON FEDERAL USERS

As general matter, the Spectrum Strategy should reflect that satellite systems are, by their nature, global networks. NTIA should emphasize spectrum allocation and planning strategies that will ensure close harmonization between the U.S. Table and the International Table to enable satellite networks to more efficiently utilize, manage, and share spectrum. Harmonization of the U.S. and International Tables will also reduce the complexity of many satellite operators' constellation management. For example, the 2200-2290 MHz band is allocated internationally for EESS (space-to-Earth) on a primary basis, and Federally in the United States.¹⁷ There is, however, no allocation for non-Federal use of this S-band downlink. After significant coordination efforts, Spire was able to coordinate this S-band downlink, but only for outside the United States.¹⁸ As a result, nearly half of Spire's ground network, which is based in the United States, is unavailable for downlink from the Spire constellation in this band.

Given the significant limits on available spectrum for EESS operations discussed throughout this comment, inconsistencies between the U.S. and International Tables introduce additional constraints on EESS operators to identify sufficient bandwidth to transmit ever-growing quantities of data collected in space to U.S. consumers. Spire encourages NTIA to adopt an approach that prioritizes harmonization with the International Table, particularly with respect to EESS spectrum.

To further reduce coordination burdens on Federal users, Spire also encourages NTIA, where possible, to study the more heavily used EESS bands—S- and X-band—to determine whether the Federal users are concentrated in particular regions would benefit from carved out protection zones. This would allow for more intensive use of the bands by non-Federal users

¹⁷ 47 C.F.R. § 2.106.

¹⁸ See, e.g. Spire Authorization at Condition 19.

without causing harmful interference to incumbent Federal users and reducing the increasing coordination burdens on Federal stakeholders.

V. CONCLUSION

Spire appreciates NTIA's continuing leadership through its development of the Spectrum Strategy. Spire encourages NTIA to undertake a review of the common EESS bands and adopt rules that will improve access to and efficient use of these bands in order to reduce regulatory and administrative burdens on non-Federal EESS operators as they continue to deliver innovative Earth observation and space-as-a-service services to Americans. Spire looks forward to working with NTIA and the Executive Branch on the development and implementation of the Spectrum Strategy.

Respectfully Submitted,

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