April 17, 2023

Scott Harris
Office of Spectrum Management
National Telecommunications and
Information Administration
1401 Constitution Avenue, N.W.
Washington, DC 20230

Re: Comments of EchoStar Satellite Services, LLC, EchoStar Global L.L.C., and Hughes Network Systems, LLC regarding NTIA request for comments on a U.S. National Spectrum Strategy

Dear Mr. Harris:

EchoStar Satellite Services, LLC, EchoStar Global L.L.C., and Hughes Network Systems, LLC ("Hughes," and collectively, "EchoStar") submit these comments in response to the National Telecommunications and Information Administration's ("NTIA") request for comments on the U.S. National Spectrum Strategy.[1] These comments provide an overview of EchoStar's current and future innovative uses of satellite spectrum, suggest certain changes in existing spectrum allocations, and propose certain principles for ensuring U.S. leadership in the satellite sector and in 5G and beyond.

In brief, NTIA should:

(1) Explore non-Federal use of the 20.2-21.2 GHz (space-to-Earth) and 30.0-31.0 GHz (Earth-to-space) bands for satellite services to meet growing demands for commercial satellite broadband spectrum for user terminals,

[1] Development of a National Spectrum Strategy, Request for Comments, 88 Fed. Reg. 16244 (rel. Mar. 16, 2023) ("RFC").

(2) Encourage the Federal Communications Commission ("Commission") to add a technology-inclusive Mobile-Satellite Service ("MSS") allocation to the 2020-2025 MHz band in the Commission's Table of Frequency Allocations,

(3) Support a future agenda item at WRC-23 to add MSS allocations in the International Table of Frequency Allocations to the 2010-2025 MHz and 2060-2070 MHz bands for Regions 1 and 3, and

(4) Support WRC-23 Agenda Item 1.19 ("AI 1.19"), which proposed to add a Fixed-Satellite Service ("FSS") (space-to-Earth) allocation in the International Table of Frequency Allocations to the 17.3-17.7 GHz band for Region 2.

Furthermore, in developing spectrum policy, NTIA and the Commission should emphasize technology- and service-inclusive frameworks that provide a reasonable amount of time for businesses to commercialize technologies and build out their systems. They should also ensure that regulatory frameworks provide stability to incentivize innovation and protect investment-backed expectations. Where possible, the U.S. Government should seek to harmonize its efforts with international regulations and industry standards.

EchoStar urges NTIA to work with its federal partners and the private sector to adopt and implement these proposed actions as part of the National Spectrum Strategy. Doing so will yield significant benefits to the public and strengthen the economic and national security of this nation.

I. EchoStar Is at the Cutting Edge of Next-Generation Satellite Services.

For over fifty years, EchoStar has been and continues to be a leader in satellite technologies and standardization. These are often multi-year projects, the fruits of which may not be seen for several years. For example, in 1985, Hughes invented the first commercial very small aperture terminal (VSAT).[2] In 1989, Hughes showed the first earth station that could be used for telephony services.[3] In 2007, Hughes launched its Spaceway satellite network, the first commercial broadband satellite launched and placed into operation.[4] More recently, EchoStar began work with the Third Generation Partnership Project ("3GPP") in the early 2010s to integrate S-band spectrum (1980-2010 MHz and 2170-2200 MHz) into the 3GPP band plan, becoming 3GPP Band 65.[5] With 3GPP

[2] *Hughes Company History Timeline*, Zippia, https://www.zippia.com/hughes-communications-careers-26781/history (last visited Apr. 17, 2023).

[3] *Id.*

[4] *Id.*

[5] Press Release, EchoStar, *3GPP Band Plan Integrates EchoStar Mobile Limited Spectrum* (Dec. 17, 2015), https://ir.echostar.com/news-releases/news-release-details/3gpp-band-plan-integrates-echostar-mobile-limited-spectrum.

Release 17 completed, S-band spectrum is now a prime candidate for 5G Non-Terrestrial Networks ("NTN"). EchoStar continues this leadership effort with the launch of the first commercial satellite LoRa (meaning "Long Range") network and with its involvement in 3GPP Release 18, which is expected later this year.

With our engineering ingenuity, service delivery expertise, and spectrum and market access rights,[6] we are uniquely positioned to offer global S-band satellite services to help meet the insatiable demand for complete and constant connectivity. EchoStar's forthcoming low-earth orbit ("LEO") Lyra constellation will deliver global Internet of Things ("IoT"), machine-to-machine, and other data services beginning in 2024. The twenty-eight satellites in this constellation will feature an advanced software-defined radio powered by the LoRa protocol for connecting very low-cost, long-lived devices.[7] EchoStar is pursuing additional landing rights to use this spectrum to provide innovative IoT services throughout the globe.

EchoStar's Lyra constellation will serve as a foundation for engineering a system with 5G wideband NTN-based capabilities that will build on 3GPP Release 17 and beyond. We are engaging with 5G NTN ecosystem partners at all levels of the value chain to support our goal of engineering a truly transformative wideband LEO-based 5G NTN capability. And as discussed below, a critical component to maximizing the potential of these systems will be the global allocation of additional spectrum for technology-inclusive MSS use.

EchoStar is also supporting other operators in the non-geostationary orbit ("NGSO") satellite segment. For example, EchoStar is an investor in OneWeb, a reseller of OneWeb services, and an ecosystem partner to OneWeb, developing gateway electronics and the core module that will power every user terminal for the OneWeb system.[8]

And with its fleet of broadband geostationary orbit ("GSO") satellites and ground network facilities, EchoStar is the largest U.S.—and fourth largest worldwide—commercial GSO operator. These GSO satellites provide broadband, video, and other services to meet the needs of small and

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[6] EchoStar holds extensive International Telecommunication Union ("ITU") rights and satellite authorizations in the S-band (between the 1980-2025 MHz and 2160-2200 MHz bands) as well as landing rights in countries around the globe.

[7] LoRa is designed for massive-scale IoT deployments. The wireless standard sends data in small, scheduled bursts, similar in size to a text message, which is perfect for devices that need to send plenty of status updates or a regular stream of measurements. The technology is also designed to require very little power so that it does not quickly drain the batteries of IoT devices.

[8] Engineered and manufactured by Hughes, the OneWeb terminals include Hughes' electronically steered antenna and compact indoor and outdoor equipment necessary to activate high-speed, low latency broadband service on the OneWeb constellation.

large customers, including internet service providers, media, broadcasters, direct-to-home providers, enterprise customers, government service providers, and residential consumers in the United States and abroad.

Our GSO operations are also an area where we continue to lead in innovation. For example, in the third quarter of 2022, we launched HughesNet Fusion. This service uses unique data handling software to seamlessly combine our satellite service with terrestrial wireless services, providing an exceptional internet experience that is responsive, reliable, and fast. The combination of satellite and terrestrial services enables support for latency-sensitive applications alongside the data-intensive services for which HughesNet satellite service is optimized, like video and downloads.

Finally, planned for launch later this year, EchoStar's Jupiter 3 satellite is the highly anticipated, next-generation Ultra-High-Density Satellite that will dramatically expand the overall reach and capacity of EchoStar's Jupiter fleet across the Americas. With two to three times the Ka-band capacity of Jupiter 2, Jupiter 3 is expected to be the world's largest commercial communications satellite when it launches, bringing the total capacity of the Jupiter fleet to more than 1 Tbps.

II. Maintaining a Spectrum Pipeline for the Commercial Satellite Industry Is Critical for U.S. Leadership in Space.

The RFC seeks comment on the U.S. spectrum pipeline in the near, medium, and long term and asks what spectrum bands should be made available for new or additional uses.[9] With the growing demand for high-speed internet, video streaming, and other data-intensive applications, the demand for satellite services has also increased. Allocating more spectrum for commercial satellite use will allow service providers to meet this growing demand and provide better quality services.

More broadly, supporting the U.S. satellite sector is crucial for U.S. national security, economic growth, space exploration, disaster response, and maintaining international competitiveness. NTIA can support this critical segment of the economy by ensuring sufficient spectrum resources are made available for the U.S. satellite industry to develop here and abroad.

The 20.2-21.2 GHz (space-to-Earth) and 30.0-31.0 GHz (Earth-to-space) bands are two gigahertz of spectrum that, for decades, have been dedicated largely to military use but are believed to be lightly utilized. Coordination between GSO satellite networks in these FSS bands to support user terminals could be managed through 2° orbital separations, and NGSO operations in these bands are also feasible through the use of elevation angles, as has been done in other bands. ITU coordination procedures and well-considered, reasonable operational restrictions would enable the

[9] RFC at 16245-46.

shared use of these bands between military and commercial operations. NTIA should investigate the actual use of these bands in the United States and abroad and determine the feasibility of adding commercial use of this spectrum to increase the efficiency of this important spectrum.

NTIA also should encourage the Commission to revise its Table of Frequency Allocations by adding an MSS allocation to the 2020-2025 MHz band. Currently, MSS and terrestrial Fixed and Mobile operators may operate on a co-equal basis in the 2020-2025 MHz band outside the United States in ITU Region 2. As seen at the recently concluded ITU Conference Preparatory Meeting, the allocation of these bands for MSS is very likely a subject of WRC-23 and WRC-27 to meet growing MSS needs. With companies like EchoStar planning for the deployment of high-capacity MSS networks to meet growing demand for 3GPP NTN services, including direct-to-device, access to additional spectrum is critical. But the band is, essentially, unused in the United States. The added MSS allocation in the United States should be technology inclusive, which will maximize the flexibility of the spectrum and avoid underuse due to mismatches between prescribed technologies and market demand. Likewise, the added allocation should not be limited to narrowband or low-power uses, which would also effectively limit the band's use cases and the market's ability to adapt it for its highest-valued uses and may, in the long run, leave it fallow as companies' business cases evolve or fail. Allocating this band for generic MSS would ensure the highest and best use of this spectrum.

Relatedly, NTIA should work with its federal partners to support the development of MSS in the 2010-2025 MHz and 2060-2070 MHz bands throughout the world. While these bands are currently allocated for MSS in ITU Region 2, there is no such allocation in Regions 1 or 3. The U.S. delegation should support at WRC-23 a future agenda item for WRC-27 on adding primary MSS allocations in the 2010-2025 MHz and 2060-2070 MHz bands in Regions 1 and 3.

Finally, the U.S. delegation should also support WRC-23 Agenda Item 1.19, which involves the addition of an FSS (space-to-Earth) allocation to the 17.3-17.7 GHz band. The Commission recently added such an allocation for GSO FSS to its own frequency table and is considering whether to add an NGSO FSS allocation as well.[10] Support for AI 1.19 would encourage other Region 2 countries to harmonize their regulations with Commission regulations. For FSS operators seeking to use this spectrum, the Region 2 allocation will make it easier to enter new markets beyond the United States.

[10] *Amendment of Parts 2 and 25 of the Commission's Rules to Enable GSO Fixed-Satellite Service (Space-to-Earth) Operations in the 17.3-17.8 GHz Band, to Modernize Certain Rules Applicable to 17/24 GHz BSS Space Stations*, Report and Order and Notice of Proposed Rulemaking, IB Docket Nos. 20-330 and 22-273, FCC 22-63 (rel. Aug. 3, 2022).

III. The National Spectrum Strategy's Frameworks Should Be Technology- and Service-Inclusive and Enable Long-Term Investment in New Spectrum Bands.

The RFC also seeks input on building durable frameworks to support U.S. spectrum policymaking.[11] These frameworks implicate novel technologies, evolving business models, and startup costs in the hundreds of millions (and often billions) of dollars. Regulators must have patience and build frameworks in anticipation that markets and technologies take time to mature. For example, the Commission's processing round framework was created in the nineties, but it took two decades for NGSO systems to even begin showing commercial viability.

To build frameworks that stand the test of time, regulators should enable the thresher of market forces to separate the wheat from the chaff—without unnecessary regulatory intervention. NTIA and the Commission should work together to develop technology- and service-inclusive frameworks that ensure that spectrum is put to its highest-valued use. For example, in representing U.S. interests in international fora, NTIA, the Commission, and U.S. delegates should not advocate for one segment of the U.S. telecom sector to the detriment of other segments, such as by advocating for mobile operators to the detriment of satellite operators and vice versa.

China has already become a leader at the ITU and at 3GPP and other bodies for advancing satellite communications—both for FSS and MSS—all while supporting its domestic wireless industry. Chinese engagement in satellite and terrestrial standardization threatens U.S. leadership on key technology policy issues. NTIA, the Commission, and other federal representatives should be vigilant for opportunities to reaffirm U.S. leadership on these issues and rebuff Chinese advances, which can be done by supporting all segments of the U.S. communications sector.

Regulators should also be sure to provide enough regulatory certainty for the market to invest sufficient capital in new spectrum bands, services, and facilities. For the satellite segment of the telecom sector, that means creating enough flexibility and having enough patience for companies to build, fail, consolidate, and rebuild. The past few decades of satellite policymaking at the Commission show why patience is key.[12] They also show why it is important to protect the certainty of incumbents. If satellite operators do not feel secure in their rights, they will not build. And with the slow pace at which standards develop, patience is key.[13]

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[11] RFC at 16246.

[12] *See, e.g.*, J. Armand Musey, *Satellite bankruptcies circa 2000 vs. 2020: We've come a long way!*, SpaceNews (Apr. 15, 2021), https://spacenews.com/op-ed-satellite-bankruptcies-circa-2000-vs-2020-weve-come-a-long-way.

[13] For example, it has taken over ten years for 3GPP to develop and approve its first 3GPP NTN standard contained in Release 17.

Of particular concern for incumbent satellite operators are their interference protection rights. Indeed, the Commission is considering how to address same-band NGSO spectrum rights, and the draft item suggests that the Commission is (correctly) accounting for investment-backed expectations of incumbent (i.e., earlier-processing-round) NGSO operators.[14] Modifying these rights to increase spectrum usage is, in the abstract, laudable. But if such modifications create regulatory uncertainty that is likely to reduce future investments, policymakers should heed those considerations to avoid underinvestment in a vital industry.

Likewise, for incumbent GSO operations, NTIA and the Commission should be wary of requests by new NGSO entrants to alter the protections afforded GSO operators (e.g., altering equivalent power flux density protections).[15] Companies build and launch satellites with an understanding of the interference environment in which they will be operating, and altering those protections after the fact will deter future investment. A proper accounting of these considerations should underlie policymakers' actions in emerging satellite bands: first, create a stable framework with sufficient spectrum, and then the market will figure out the rest.

Also, critical to building regulatory certainty is harmonizing (where possible) the U.S. regulatory framework with international regulations and industry standards. For example, current standards require certain bandwidth channels for operations (e.g., 3GPP NTN requires 5x5 megahertz channels). EchoStar urges that, in opening new bands for additional uses, those new uses are harmonized with existing and/or forthcoming international and industry standards.

Finally, 6G is on the horizon. The lines between terrestrial and non-terrestrial operations will likely become even more blurred, and many futurists believe satellite systems will play an increasingly larger role in telecommunications networks as the 6G "internet of the senses" comes to fruition.[16] Policymakers should avoid granting preference to terrestrial uses assuming that those

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[14] *Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems*, Draft Report and Order and Further Notice of Proposed Rulemaking, IB Docket No. 21-456, FCC-CIRC2304-03 (rel. Mar. 30, 2023).

[15] *See, e.g., Space Exploration Holdings, LLC Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System*, Order and Authorization, IBFS File Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818-00105, FCC 22-91 ¶ 29 (rel. Dec. 1, 2022) ("SpaceX argues that the current methodology of evaluating compliance with EPFD limits is overly protective of GSO operations and too restrictive for NGSO operators.").

[16] *See, e.g.*, Caio Castro, *Satellites Will Complement Current Networks in 6G – But How?*, 6GWorld (June 14, 2022), https://www.6gworld.com/exclusives/satellites-will-complement-current-networks-in-6g-but-how ("Some LEO constellations are expected to directly target phones, cars, and Internet-of-Things devices using 3GPP standards. That is why 'satellite components shall be integrated seamlessly with dominant 5G/6G terrestrial networks' to contribute to 6G.").

will be the most valuable uses in the future. Doing otherwise incentivizes the inefficient use of spectrum because "more" can always be asked for later.

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EchoStar welcomes NTIA's engagement with stakeholders to augment this critical component of U.S. economic and national security. Adopting the proposals discussed here will help ensure the U.S. National Spectrum Strategy maximizes the use of limited spectral resources both in the near and long term.

Please contact me with any questions about this submission.

Respectfully submitted,

/s/ Jennifer A. Manner

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