

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 to Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz ) Frequency Band; Allocation of Spectrum in the ) 46.9-47.0 GHz Frequency Band for Wireless ) Services; and Allocation of Spectrum in the 37.0- ) 38.0 GHz and 40.0-40.5 GHz for Government ) Operations )	)	IB Docket No. 97-95

**COMMENTS OF THE SATELLITE INDUSTRY ASSOCIATION**

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## EXECUTIVE SUMMARY

The Satellite Industry Association welcomes the opportunity to address spectrum sharing in and among the 27.5-28.35 GHz band (the “28 GHz” band), 37.5-38.6 GHz band (“37 GHz band”), and the 38.6-40 GHz band (the “39 GHz band”). The disparate maturity levels of the technologies and services that are being asked to share this spectrum provide an opportunity for the FCC to consider innovative regulatory solutions in this proceeding. While the wireless industry is in the early stages of exploring services and business models that harness millimeter wave technologies, a decade of research and development in Ka-band satellite technologies has already yielded substantial deployments of innovative and high-capacity broadband services. The satellite industry currently uses the Ka-band to deliver broadband and other high-bandwidth communications to underserved areas, compete with terrestrial services in markets where competition is needed most, increase the effective footprint and capacity of terrestrial networks, and support critical public safety and military communications that terrestrial networks cannot provide. These services make satellite companies an essential component of the U.S. telecommunications system, and critical participants in the delivery of new mobile broadband technologies, including 5G.

The years of research and development and billions of dollars of investment capital that have brought satellite communications to the commercial forefront have also allowed the United States to take a leading role in space-based innovation and laid the foundation for significant exports of U.S.-manufactured commercial satellites and services. An effective and flexible spectrum sharing regime will promote continued investment and drive successive generations of satellite services, for the benefit of both U.S. consumers and the satellite manufacturing and ground industries that contribute to the satellite ecosystem.

The Commission's proposed rules, however, could cause the U.S. satellite industry to lose its momentum, place critical communications services at risk, and deprive consumers of the full promise of 5G networks and the Internet of Things, which will benefit substantially from the reach and reliability of satellite networks. Satellite operators must raise and invest substantial amounts of capital into satellite systems with long lead times and service life spans, but with an eye to a constantly evolving marketplace. They cannot commit the enormous resources required to operate and upgrade existing earth stations, or design and construct new space stations and earth stations, if access to the spectrum they use is restricted to the point that it becomes difficult or impossible to operate. For that reason, spectrum uncertainty puts investments in satellite services at risk, threatening both existing consumers and the expansion and innovation required to keep pace with marketplace demands. The proposed rules for the 28 GHz, 37 GHz, and 39 GHz bands would create enormous spectrum uncertainty for satellite services because they do not provide the clear types of protections necessary to obtain investment and operate satellite networks. Instead, these rules would force satellite operators to purchase rights in an undefined spectrum market, unless the operator qualifies for rule-based grants under exceptions that are too limited in scope to be practical.

Alternatives to the Commission's proposals would permit both satellite and terrestrial mobile services to thrive by allowing the parties to work out an appropriate sharing environment based on concrete deployment plans. To facilitate this approach, the Commission should grant co-primary status to all individually licensed FSS earth stations in the 28 GHz band, even if the application is filed after the release of the notice of proposed rulemaking in this matter, and conclude its rulemaking for V-band frequencies to allow licensed earth stations to operate on a co-primary basis in the 39 GHz band. The FCC should implement co-primary sharing in these

bands by designing rules for terrestrial mobile services on the basis of the known technical parameters of existing and planned satellite services. There is no reason to believe that any resulting limits on power or other parameters would inhibit deployment of next generation terrestrial mobile broadband services. Indeed, because the new rules would provide these services with clear guidelines as they develop their technology and sharing strategies, this approach would allow for a clear interference environment as new uses of millimeter wave spectrum are being developed.

Finally, while the Satellite Industry Association files these comments on behalf of its members, it is essential to understand that individual members' networks vary significantly and many will be filing comments in their own name to ensure that the record reflects the necessary characteristics and interference environment for their services.

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**COMMENTS OF THE SATELLITE INDUSTRY ASSOCIATION**

The Satellite Industry Association (“SIA”) hereby submits comments in response to the Commission’s Notice of Proposed Rulemaking (“NPRM”) in the above-referenced proceeding.<sup>1</sup>

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<sup>1</sup> *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, GN Docket No. 14-177, et al., Notice of Proposed Rulemaking, 30 FCC Rcd. 11,878 (2015) (“NPRM”).

## INTRODUCTION

For over fifty years, satellite technology has played an instrumental role in telecommunications innovation. Satellite companies provide competitive broadband services to approximately two million U.S. subscribers, extend the reach and capacity of terrestrial networks, and support critical national security, public safety, and commercial communications when and where terrestrial services are compromised or unavailable. And satellite networks are still growing in size, number, and sophistication. Looking ahead, the industry is in the forefront of innovations that promise to further expand access to broadband connectivity, support higher speed and higher bandwidth wireless backhaul, introduce critical advancements in public safety communications, and serve as a harbinger of tomorrow's advanced global networks, including 5G and the Internet of Things. High-risk, high-impact, and high-dollar investments have and are making this success possible. With an effective regulatory regime, billions in additional investment will drive a new generation of satellite innovations, accommodate surging demand for satellite service, and further strengthen the United States' position as a global leader in advanced satellite communications.

Given its pioneering history, transformative future, and growing need for spectrum, the satellite industry understands the goals behind this proceeding very well. SIA recognizes that administrations around the world may implement 5G services differently and potentially in different frequency bands. Nevertheless, it welcomes this proceeding as an opportunity for satellite and terrestrial interests to work together to define a mutually beneficial regulatory environment in the bands above 24 GHz.

Below, SIA describes the critical telecommunications services provided by satellites, the satellite industry's trajectory of growth and innovation, and the significant risks that the NPRM

could pose to both commercial and government users that rely on satellite communications, if the Commission's proposals are not modified to take into account the requirements of the satellite operators in the bands today and in the future. SIA then suggests an alternative framework that would allow both emerging terrestrial services and existing and emerging satellite services to thrive in millimeter wave spectrum, and reaffirms its commitment to working with terrestrial operators towards a consensus for efficient spectrum sharing.

#### **I. The Satellite Industry Plays a Vital Role in the U.S. Telecommunications System.**

Because of the unique reach of satellite systems, satellite operators deliver broadband and other high-bandwidth services to underserved areas, compete with terrestrial services in markets where competition is needed most, increase the effective footprint and capacity of terrestrial networks, and support critical public safety and government communications that terrestrial networks cannot provide. These services make satellite companies an essential component of the U.S. telecommunications infrastructure, and a necessary complement to new mobile broadband technologies, including 5G.

The satellite industry has emerged as a key supplier of broadband and advanced video services in the United States, and has embarked on an ambitious series of initiatives to launch a new generation of satellites capable of supporting the higher speeds and bandwidth demanded by modern communications applications.

Currently, satellite direct-to-home services, such as those offered by DIRECTV and DISH, bring digital content to over 34 million U.S. subscribers, and over 230 million subscribers worldwide.<sup>2</sup>

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<sup>2</sup> See Satellite Industry Association, *2015 State of the Satellite Industry Report*, at 12 (Sept. 2015) ("2015 SIA Report"), <http://www.sia.org/wp-content/uploads/2015/06/Mktg15-SSIR-2015-FINAL-Compressed.pdf>.

Hughes, the largest satellite broadband provider in the United States, serves approximately one million North American subscribers via its Spaceway 3 and Jupiter 1 satellites operating in the Ka-band, and will bring significant advancements in broadband capacity for U.S. consumers through its launch of the EchoStar XIX high-throughput Ka-band satellite later this year. Hughes is also deploying broadband satellite service in Brazil later this year and in other portions of Latin America in the near future.

ViaSat provides satellite broadband services to approximately 700,000 customers, delivering broadband speeds of up to 25/3 Mbps using the ViaSat-1 Ka-band satellite at fixed locations, as well as in-flight on over 400 commercial aircraft. The expected launch of ViaSat-2 will soon double the capacity available to ViaSat consumers in the United States, and a third-generation high-capacity Ka-band satellite will provide over 1 Terabyte per second (1,000 Gbits/s) of throughput.<sup>3</sup>

Through its Broadband Global Access Network service, Inmarsat provides global voice and data to tens of thousands of subscribers. Inmarsat also recently launched Global Xpress, a Ka-band service capable of delivering downlink speeds of up to 50 Mbps with global reach.

O3b Limited brings broadband connectivity to U.S. customers in the telecommunications, energy, maritime and government sectors, and to underserved areas across four continents. After experiencing record growth in customer demand, O3b recently secured \$460 million in financing to expand its constellation with eight additional Ka-band high-throughput satellites.

To support additional satellite broadband applications, both Intelsat and SES are building high-throughput satellites for launch in the next several years. For example, Intelsat 29e, which launched earlier this month and is the first of a series of such satellites, represents a qualitative

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<sup>3</sup> See *ViaSat Q2 2015 Earnings Conference Call* (Nov. 9, 2015), available at <http://investors.viasat.com/events.cfm>.

leap in terms of throughput, flexibility, and efficiency. As another example, the SES-15 satellite is scheduled for launch by mid-2017 and will support traffic-intensive data applications and VSAT networks for aeronautical, maritime, and government users in North America and beyond.

Iridium's satellite network provides basic communications, smartphone access, and advanced machine-to-machine applications to commercial and government customers, including the U.S. military and national security agencies. This year, Iridium will begin launching its next-generation low-Earth orbit satellite constellation (Iridium NEXT), which will provide mobile broadband capabilities anywhere in the world, and support satellite-based innovation across a number of applications using an affordable hosted payload solution.

Other satellite operators, such as Telesat, have also launched or plan to launch high-throughput satellites in the next several years, and considerable investment has been made in future systems like the nongeostationary orbit network OneWeb, which raised more than \$500 million of initial funding in 2015.

The ubiquitous reach of satellite networks has also brought the services discussed above to remote, rural, and hard-to-reach places, promoting the FCC's universal access objectives and spurring competition with cable and telco-provided media and Internet access services. Indeed, with recent advancements in speed and bandwidth network management, many satellite services have emerged to be fully competitive with terrestrial broadband offerings. In fact, terrestrial service providers have themselves come to rely on satellite services to expand coverage and capacity for their own networks. For example, most of O3b's customers are local telcos and Internet service providers, which use O3b's services to extend the reach of their terrestrial networks to end users located in underserved markets—including completely "unlit" areas with no other means of connectivity. Along the same lines, O3b, Hughes, Intelsat, and other satellite

operators provide mobile carriers with flexible wireless backhaul solutions. All satellite broadband services provide a means for terrestrial networks to increase peak capacity by offloading traffic, as do Wi-Fi access points powered by satellite broadband connections. As consumer needs for bandwidth continue to rise, and as satellite broadband services continue to advance and expand, so too does the reliance of terrestrial fixed and wireless networks on satellite services, including those that will be expanding by operating on a 5G standard.

Satellite networks not only support and compete with terrestrial networks for consumer-related services, they also provide critical commercial, government, and public safety services that terrestrial networks simply cannot support. For example, satellite networks enable broadband access on aircraft, vessels, and land vehicles, as well as aircraft and maritime safety systems. By providing a means to communicate with machines regardless of their location, satellite networks also support worldwide asset-tracking and fleet communication capabilities and expand the possibilities of the Internet of Things. Satellite networks also provide indispensable government and military communications and function as a last line of communications during natural and man-made disasters. Satellites enable battlefield communications between U.S. military personnel, provide secure communications to intelligence agencies, and power self-sufficient networks that allow first responders to coordinate search, rescue, and rehabilitation efforts in the wake of natural disasters that shut down terrestrial services.

The rapid pace of satellite launches in recent years has been a natural consequence of the growing demand for satellite services. Indeed, global satellite industry revenues have more than doubled over the past ten years, crossing \$200 billion in 2014.<sup>4</sup> Subscribership for satellite-

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<sup>4</sup> 2015 SIA Report at 5.

distributed video, radio, and broadband services also continues to rise sharply.<sup>5</sup> And like other telecommunications providers, satellite operators are facing rapid increases in data traffic that far exceed current and expected capacity. This, in turn, is requiring satellite operators to identify additional spectrum to support the expansion of services required to accommodate their users' increasing adoption of bandwidth-intensive applications.

## **II. The Commission's Proposed Rules Could Stifle Existing and Expanded Satellite Services.**

In the NPRM, the Commission sought to “establish a flexible regulatory framework that accommodates as wide a variety of services as possible.”<sup>6</sup> It also sought to ensure that terrestrial mobile use of millimeter wave spectrum would remain “compatible with existing incumbent license assignments and uses.”<sup>7</sup> The rules as proposed in the NPRM, however, would create significant uncertainty for the satellite industry. The proposed rules do not provide adequate assurances that satellite networks will have access to the 28 GHz band that is in use today, and to necessary expansion spectrum that satellite providers are counting on to accommodate consumers' growing demand for bandwidth-intensive services and applications. If satellite providers are deprived of the confidence and stability they need to operate, upgrade, and expand their services, this uncertainty would place critical consumer, public safety, and government services at risk, slow the pace of path-breaking advancements in satellite communications, and have repercussions beyond the satellite industry by discouraging large-scale wireless telecommunications investment going forward.

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<sup>5</sup> *Id.* at 12.

<sup>6</sup> NPRM ¶ 23.

<sup>7</sup> *Id.* ¶ 22.

**A. To Continue Investing in Satellite Services, Satellite Operators Need Regulatory Certainty That Earth Stations Will Have Clear Operational Protections.**

Under the U.S. Table of Allocations, the Fixed-Satellite Service (“FSS”) is co-primary in the 28 GHz band. By rule, however, FSS earth stations in the band operate on a secondary basis to the Local Multipoint Distribution Service (“LMDS”), a fixed wireless service. For years, FSS earth stations have successfully shared 28 GHz spectrum with LMDS, as well as with other satellite earth stations. The deployment patterns of both LMDS and FSS earth station facilities, and the fixed nature of LMDS stations, have enabled this spectrum sharing. In the 37 GHz and 39 GHz bands, FSS earth stations are also allocated co-primary with terrestrial services. Satellite operators have committed substantial resources to develop this spectrum over the years in anticipation of putting it to use in the near future, once the Commission concludes the V-band rulemaking.<sup>8</sup>

Although satellite companies have historically been able to operate earth stations on a secondary basis in the 28 GHz band, the entry of terrestrial flexible use services (“FUS”)<sup>9</sup> threatens to alter the current successful sharing environment with LMDS and create an untested and uncertain sharing environment in the 37 GHz and 39 GHz bands. With the limited information available on 5G network technical characteristics, FSS operators are not able to assess the interference environment that would result from the co-existence of FSS and FUS systems, and therefore cannot determine how to design, locate, or update ground infrastructure to co-exist with FUS operations. The satellite industry is engaged with the terrestrial mobile industry in order to gain insight into this environment, but 5G plans and network operational requirements are far from clear at this time. Moreover, without a regulatory framework for co-

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<sup>8</sup> NPRM ¶ 35.

<sup>9</sup> *Id.* ¶ 92-93.

existence, providers of terrestrial mobile services will have limited information available to guide the development and deployment of these services in a way that is compatible with existing and future satellite services in the band. For satellite operators making and seeking to make substantial investments, sharing with new terrestrial mobile services could prove highly challenging if satellite services are subordinate.

Satellite operators cannot commit the resources required to operate and upgrade existing earth stations, or design and construct new space stations and earth stations to provide the services that their customers are demanding, if the spectrum they use to communicate could become encumbered. And because earth stations are critical components of satellite networks, this uncertainty could reduce investment in future satellite services in these bands. This is especially true given the unique attributes of satellite technology, which have long lead times and return on investments over an unusually long asset service life. Indeed, in response to the Commission's Notice of Inquiry, SES, Intelsat, Inmarsat and O3b commented that "the uncertainty of being secondary to potential future terrestrial systems deters additional FSS investment," because FSS earth stations support "large portions of a satellite network."<sup>10</sup> Similarly, EchoStar emphasized that regulatory certainty is even more critical to FSS systems than it is to other telecommunications networks, given that "satellite technology has a long development path," is "extraordinarily complex," and requires "considerable time and upfront costs to plan, build and launch."<sup>11</sup> The Commission itself recognized that FSS operators must

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<sup>10</sup> Comments of SES Americom, Inc., Intelsat Corporation, O3b Networks USA LLC, and Inmarsat, Inc. at 4, GN Docket No. 14-177, et al. (filed Jan. 15, 2015).

<sup>11</sup> Comments of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Alta Wireless Inc. at 14, GN Docket No. 14-177, et al. (filed Jan. 15, 2015).

have “certainty that” their “earth station[s] would not have to shut down” in order to have “an incentive” to invest in satellite operations.<sup>12</sup>

If satellite operators are discouraged from continuing, expanding, and upgrading their Ka-band services, valuable—and in some cases irreplaceable—communications services, as described above, will be placed at risk. Moreover, with ever-increasing demand for high-bandwidth broadband services, the continued provision of these and other satellite offerings will depend on the availability of V-band spectrum. As O3b reported, “satellite services in the V-band also need regulatory certainty to ensure future access to global markets,” because “[c]ontinued growth and expansion of broadband satellite services depends on having FSS spectrum allocated . . . with sufficient bandwidth to support next-generation applications.”<sup>13</sup>

The consumer and public interest benefits of satellite services provide enough reason to ensure that satellite operators have the certainty they require to invest in their services. But the Commission should protect incumbent satellite services for equitable reasons as well. While FSS operators have planned for and reasonably expected to share the 28 GHz band, they have made decisions to invest in this spectrum in reliance on the current band plan and sharing environment. Moreover, many of the systems operating in the 28 GHz band are supported by satellites that were only recently launched or will be launched in the near future, and by ground infrastructure that has been recently constructed or is in the final planning stages. As just one example, SES’s SES-15 satellite is almost halfway through construction, and has fixed gateway beams that cannot be redesigned. If any one of those gateway beams were to be unusable, SES-15 would not be capable of serving large portions of the United States.

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<sup>12</sup> NPRM ¶ 139.

<sup>13</sup> Comments of O3b Limited at 12, GN Docket No. 14-177, et al. (filed Jan. 15, 2015).

As has always been the case, the Commission must consider how new rules that could impact existing expectations based on long-standing regulatory frameworks would impact investments now and decisions for the future. All telecommunications providers—and not just satellite operators—need confidence that the returns on their investments will not be frustrated by sudden and unanticipated regulatory changes. Given the immense resources satellite operators have developed for the 28 GHz band, and the number of years remaining in the economic life of this network infrastructure, inadequate accommodation of satellite services would discourage these and other important investments and follow-on investments in the future.

In the NPRM, the Commission suggested that the secondary status of FSS earth stations in the 28 GHz band undermines any entitlement to continue their services once terrestrial mobile services enter the band. Specifically, the Commission determined that the requirement that earth stations would have to operate on a non-interfering basis with these new services was part of the “reasonable expectations” of FSS operators.<sup>14</sup> This is not an accurate statement of the status of the band or the reasonable expectations of satellite operators. The allocation for FSS operations in 28 GHz is in fact co-primary.<sup>15</sup> By rule, the FCC determined that FSS earth stations should operate on a secondary basis in the band, but only with respect to LMDS—not with respect to any other service permitted by the Table of Frequency Allocations.<sup>16</sup> The Commission consistently acknowledged that its rules designate FSS operators “as secondary users [of 28 GHz] *with respect to LMDS*”—a fixed service—and not with respect to new terrestrial mobile

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<sup>14</sup> NPRM ¶ 31.

<sup>15</sup> See U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106.

<sup>16</sup> 47 C.F.R. § 25.202(a)(1) n.2; *In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission’s Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed-Satellite Services*, 11 FCC Rcd. 19005, ¶ 45 (1996) (“28 GHz First Report and Order”).

services contemplated in the NPRM.<sup>17</sup> Indeed, as the Commission itself observed, “there has been little discussion of mobile use” in 28 GHz before now, because “there has not been any technology that would allow for mobile use of the millimeter wave bands.”<sup>18</sup> The Commission cannot redefine the satellite industry’s reasonable expectations on the basis of these service rules by ignoring the context in which the rules were adopted. Nor can the Commission conclude that a fundamental and unexpected *change* to the rules governing terrestrial use of 28 GHz spectrum would leave the satellite industry’s reliance interests undisturbed.

With respect to 37 GHz and 39 GHz, the Commission similarly understated the reliance of the satellite industry on the well-established priorities in the V-band, on the premise that “satellite interests” lack “firm commitments or plans to use” this spectrum.<sup>19</sup> This, too, is not an accurate summary of the history of the band. Satellite operators have placed considerable financial resources behind the V-band since the Commission first auctioned 39 GHz terrestrial licenses over fifteen years ago,<sup>20</sup> and have made significant, concrete investments in developing the band for satellite use since that time. Indeed, satellite manufacturers have been actively developing technology to support V-band payloads,<sup>21</sup> and in 2013, the European Space Agency

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<sup>17</sup> *Rulemaking to Amend Parts 1, 2, 21, & 25 of the Commission’s Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules & Policies for Local Multipoint Distribution Serv. & for Fixed Satellite Servs.*, First Report and Order and Fourth Notice of Proposed Rulemaking, 12 FCC Rcd. 22310 ¶ 42 (1997); *28 GHz First Report and Order*, ¶ 48.

<sup>18</sup> NPRM ¶ 31; *see also* ¶ 5 (noting that the millimeter wave bands “have historically been considered unsuitable for mobile applications because of propagation losses at such high frequencies and the inability of mmW signals to propagate around obstacles”).

<sup>19</sup> *Id.* ¶ 23.

<sup>20</sup> *See TRW Inc.*, 16 FCC Rcd. 5198, 5200 ¶ 5 (Wireless Telecomm. Bureau 2001) (documenting purchase by satellite operator of 100 licenses at the 39 GHz auction).

<sup>21</sup> *See* Comments of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Alta Wireless Inc. at 9, GN Docket No. 14-177, et al. (filed Jan. 15, 2015) (reporting that

in partnership with Inmarsat launched a satellite with a Q/V-band payload to explore the feasibility of using the V-band for commercial satellite services.

**B. The Protections Proposed for Satellite Services in the 28 GHz, 37 GHz, and 39 GHz Bands Are Inadequate.**

The rules proposed in the NPRM do not provide the confidence that satellite operators need to invest in their services. These rules leave open the possibility that earth stations in the 28 GHz band will have to transmit on a non-interfering basis with respect to terrestrial mobile services, and that downlink transmissions in V-band satellite expansion spectrum will have to accept interference from these services. Left unchanged, these rules would create enormous uncertainty as to whether the spectrum will remain available or useful to satellite services as new mobile services are authorized in these bands.

**1. The 28 GHz Band**

Under the proposed rules, the Commission would issue flexible use licenses in the 28 GHz band to active LMDS licensees by rule and to other parties by auction.<sup>22</sup> These licenses would authorize ubiquitous terrestrial fixed and mobile service in the band. FSS earth stations would operate on a secondary basis to these new FUS services, unless the FSS operator purchases a flexible use license in a secondary spectrum marketplace designed for and dominated by terrestrial operators, or is eligible to obtain terrestrial rights through one of the following rule-based mechanisms. For earth stations that are currently licensed or have pending applications for authorization (referred to in the NPRM as “existing” earth stations), the FCC proposes to grant FSS operators terrestrial rights for the census tract (or some other area to be determined) in which the existing earth station is located, but only if the earth station is outside

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“satellite manufacturers have been actively working on technology to support FSS use” of V-band spectrum).

<sup>22</sup> NPRM ¶¶ 93-95.

the license area of an active LMDS licensee, and only if the earth station is “in operation and providing service.”<sup>23</sup> These rights would have an effect similar to – though in important ways, not the same as – upgrading the earth stations to co-primary status. For earth stations that are the subject of an application for authorization submitted prior to the FCC’s first auction for flexible use licenses (referred to in the NPRM as “future” earth stations), FSS operators could obtain a waiver of the earth station’s secondary status, but only if the earth station is outside the license area of an active LMDS licensee, and only if the licensee demonstrates that the earth station is unlikely to have a negative impact on future terrestrial service under an unspecified legal standard.<sup>24</sup>

These rules are insufficient to protect the enormous sunk investment in FSS earth stations and accommodate necessary expansion of satellite services going forward. First, even for earth stations that would be eligible to obtain protection from interference without the purchase of a license, the FCC’s proposal is fraught with uncertainty. The waiver process for future earth stations is inherently uncertain, as it relies on an individualized regulatory determination made well after development of the earth station and associated satellite is under way. The fact that the FCC has not proposed a clear standard for granting waiver requests, and cannot develop practical waiver criteria until 5G technical characteristics become available, compounds this uncertainty. While satellite operators are willing to locate and construct new earth stations with co-existence in mind, the lack of a clear path toward approval would inhibit necessary expansions and upgrades of satellite services.

Second, the opportunities for a rule-based upgrade to co-primary status do not apply to enough earth stations to adequately protect satellite operators and their consumers. Under the

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<sup>23</sup> *Id.* ¶¶ 137-141.

<sup>24</sup> *Id.* ¶¶ 143-146.

proposed rules, all existing earth stations and future earth stations within LMDS license areas would continue to operate on a secondary basis, with no protection from interference from new mobile terrestrial services. However, many of these earth stations are or will be located within the territory of an active LMDS licensee. These earth stations support a wide array of critical satellite services, and cannot be ignored as the Commission develops its new approach to the 28 GHz band. Moreover, as FSS operators expand their services, they will need to build additional earth stations using the same spectrum that they use today—before and after the FCC holds its first auction for flexible use licenses. Thus, limiting protection to a subset of earth stations that are “in operation and providing service” prior to the auction provides little comfort to satellite operators, who cannot make necessary infrastructure investments without being certain that their plans will be supported by sufficient spectrum and ground infrastructure when faced with subscribership and consumer demand for higher capabilities on their satellite networks.

For all earth stations located in active LMDS areas, future earth stations located outside active LMDS areas that prove ineligible for a waiver, and any earth station for which authorization is sought after the first auction for flexible use licenses is held, FSS operators would have to obtain terrestrial rights through mechanisms that are unreliable, costly, and would inefficiently allocate spectrum.

Specifically, the FCC proposes that FSS operators purchase terrestrial rights for their earth stations at auction. To prevail in an auction, however, an FSS operator would have to bid a market-clearing price for an *entire county* to protect an earth station that would affect only a tiny portion of the licensed area. If the earth station is located near the border of several counties, the FSS operator would conceivably have to secure winning bids for two or more licenses. While in

theory FSS operators could attempt to recoup some of their bids by selling partitions to terrestrial operators on a secondary spectrum market, in practice this mechanism would be too unreliable to depend upon, and too costly to be practical or efficient.

The only remaining option available to FSS operators would be to forego participation in the auction and rely instead on negotiations with a flexible use licensee. Here, too, the FCC's proposed secondary market is not likely to succeed. The transaction costs will be very high and the incentive for terrestrial operators to negotiate in good faith will be very low. Thus, the required deals may simply never come to fruition, effectively blocking the satellite operators from using the band. This is because the areas affected by FSS earth stations are often extremely small relative to a BTA or even a county, resulting in little incentive for existing licensees to negotiate leases or partitions with FSS operators on reasonable terms. Terrestrial operators may also view satellite operators as competitors, increasing the chance that the terrestrial rights required by FSS operators would ultimately prove unavailable. The problem is compounded for satellite operators that must secure protection for an earth station that is near the border of several counties. In this case, the FSS operator would have to negotiate with numerous licensees, multiplying the time and resources necessary to close a deal, creating the specter of holdout dynamics, and amplifying the concerns with transaction costs that uniquely apply to satellite companies. Finally, even in portions of their licensed areas where terrestrial carriers are unlikely to use high frequency spectrum, existing licensees may be unwilling to put a value on this spectrum until 5G technical characteristics are better understood. This dynamic would delay the ability of satellite operators to plan their next-generation facilities and services.

## **2. The 39 GHz Band**

In the NPRM, the Commission proposes to authorize terrestrial mobile services in the 39 GHz band in a manner similar to its approach to 28 GHz: grants of flexible use licenses by rule to incumbent licensees, to be followed by an auction. To accommodate future earth station operations in this band, the FCC proposes to allow FSS operators to upgrade to co-primary status by applying for a waiver, but only in areas located outside the area of an incumbent licensee.<sup>25</sup> To obtain protection for all other earth stations, FSS operators would have to obtain a flexible use license at auction or on the secondary market.

For the same reasons described above—namely, the uncertainty associated with the waiver process, the possibility that future earth stations may be located within the license area of an existing 39 GHz licensee, and the problems associated with satellite participation in a flexible use license marketplace designed for terrestrial services—these avenues of protection are insufficient to support development of the 39 GHz band for satellite services. Accordingly, they would leave satellite companies with no clear pathway to expanding their services in this band as demand for capacity grows increasingly intense.

## **3. The 37 GHz Band**

In the 37 GHz band, the Commission proposes a hybrid licensing regime. Under the plan, the Commission would award local area operating rights by rule to persons with an interest in a “physical facility” or other bounded premise location. These rights would allow the “private[] deploy[ment of] networks that can provide 5G communications for advanced enterprise and industrial applications.”<sup>26</sup> For off-premises areas, the Commission would auction separate rights to operate wide area networks in the typical carrier model. To accommodate

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<sup>25</sup> *Id.* ¶ 162.

<sup>26</sup> *Id.* ¶ 100.

satellite use in the band, the Commission seeks comment on whether to allow FSS operators to apply for a waiver to operate on a co-primary basis in this spectrum. Although the NPRM does not address the issue specifically, it appears that FSS operators may be able to acquire terrestrial rights for their earth stations at auction.

Given the FCC’s reliance on a waiver and auction process in this band—and the even more complicated and less understood sharing issues created by the FCC’s novel hybrid approach—the NPRM provides no meaningful certainty that satellite operators will be able to use 37 GHz spectrum for expansion.

### **III. Alternatives Are Available That Would Accommodate Both Terrestrial and Satellite Services.**

SIA recognizes that the FCC must strike a “balance . . . between incumbent operations and new flexibility” in the millimeter wave bands.<sup>27</sup> For the reasons explained above, however, the current proposal remains heavily unbalanced, as it would deprive satellite operators of the regulatory certainty they need to provide their existing services and plan those of the future. There is, however, a better way forward that would allow both satellite and terrestrial services to co-exist.

To provide genuine protection of satellite uses of millimeter wave spectrum and accommodate growth in satellite services, SIA proposes that the FCC designate individually licensed FSS earth stations as co-primary in the 28 GHz band, even if the application is filed after the release of the NPRM in this matter, and conclude its rulemaking for V-band frequencies to allow licensed earth stations to operate on a co-primary basis in the 39 GHz band. To implement co-primary sharing of 28 GHz and 39 GHz spectrum, the FCC can design rules for an unknown array of terrestrial mobile services on the basis of the known technical parameters of

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<sup>27</sup> *Id.* ¶ 131.

satellite services. Specifically, the FCC should allow the parties to submit information on the planned size, transmission power, and minimum elevation angles of existing and potential future FSS earth stations to obtain information that can be used to arrive at an interference environment for co-frequency terrestrial services operating in the immediate vicinity. The FCC could also seek information on the characteristics of existing and potential future FSS receiving space stations to develop information on the interference environment for co-frequency terrestrial transmission towards receiving space stations. This information could be used to derive appropriate limits for terrestrial mobile operations that could assist manufacturers of FUS equipment and FUS operators with guidelines to consider as they develop their technology and sharing strategies. As a part of this process, the Commission should address the need to protect satellite networks from deployment of FUS systems in the 28 GHz band. Although FSS use of the 28 GHz band is in the Earth-to-space direction, aggregate interference from FUS deployments could cause harmful interference into satellite receivers.

There is no reason to believe that the resulting protections would inhibit deployment of next generation mobile broadband services. At a maximum, all parties would be able to understand the anticipated interference environment and plan accordingly using geographic separation or other techniques. Should the FCC adopt this approach, SIA remains committed to ensuring that final rules are consistent with terrestrial mobile operations in most locations where 5G technology will rely on millimeter wave spectrum to provide service.

SIA believes that the initial focus in this proceeding can be on FSS equipment at fixed locations. However, SIA also urges the Commission to recognize the needs and plans of the satellite industry to also use the 28 GHz band for satellite earth stations on moving platforms and

at end-user premises, both domestically and internationally.<sup>28</sup> Indeed, having a complete understanding of the services and applications, and the operating environment, in the band is essential to fully addressing compatibility between these satellite applications and FUS.

### **CONCLUSION**

SIA urges the FCC to fully explore the alternatives advanced in this filing. For satellite network operators, their subscribers, and the critical government and public safety services only satellite networks can provide, the stakes of this proceeding are difficult to overstate. With continued and certain access to millimeter wave spectrum, satellite services will support, complement, and compete with terrestrial networks, expand the capabilities of 5G services, and remain a critical feature of the U.S. telecommunications infrastructure well after 5G networks are deployed.

Respectfully submitted,

**SATELLITE INDUSTRY ASSOCIATION**

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<sup>28</sup> The international table of frequency allocations does not differentiate among different applications of the FSS in the 28 GHz band.