

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

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for	)	GN Docket No. 14-177
Mobile Radio Services	)	
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90,	)	WT Docket No. 10-112
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	)	

**COMMENTS OF SPACE EXPLORATION TECHNOLOGIES CORP.**

Space Exploration Technologies Corp. (“SpaceX”) submits these comments in response to the Third Further Notice of Proposed Rulemaking (“Third FNPRM”) in the above-captioned proceeding.<sup>1</sup> SpaceX appreciates the Federal Communications Commission’s (“Commission”) ongoing efforts to identify and allocate additional spectrum for use by next-generation services. To speed broadband deployment and to ensure that consumers are given the opportunity to decide for themselves the services that best meet their needs, the Commission’s policies should encourage providers of all next-generation technologies to develop and deploy new services expeditiously. In order to meet this goal in the context of the 50.4-51.4 GHz frequency band, the Commission should refrain from choosing one technology over another and should instead adopt rules that provide meaningful opportunities for both next-generation satellite and 5G wireless

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<sup>1</sup> *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, 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*, GN Docket No. 14-177, WT Docket No. 10-112, Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, FCC 18-73 (2018) (the Third Further Notice of Proposed Rulemaking, the “Third FNPRM”).

operations. Technologies operating in these high ranges—both terrestrial and satellite—are the bleeding edge of wireless innovation. At this early stage, the Commission would best serve the public interest by allowing all emerging technologies to evolve and compete without choosing a preferred industry at the expense of the potential customers of another. Specifically, instead of prescriptively and unnecessarily limiting fixed-satellite service (“FSS”) earth station deployments in a given geographic area in the 50.4-51.4 GHz band, the Commission should allow deployment when satellite providers are able to demonstrate that they can operate below a specified interference threshold.

## **I. THE SPACEX SYSTEM.**

SpaceX is designing, building, launching and operating a non-geostationary orbit (“NGSO”) satellite system optimized for broadband services to be delivered in the U.S. and around the world, helping to close the digital divide. The SpaceX system comprises two constellations: a low-Earth orbit (“LEO”) constellation made up of 4,425 satellites operating in the Ku- and Ka-band spectrum;<sup>2</sup> and a very low-Earth orbit (“VLEO”) constellation made up of 7,518 satellites operating in the V-band spectrum, including the 50.4-51.4 GHz band.<sup>3</sup> When combined, the LEO and VLEO constellations will enable the SpaceX system to bring needed competition to highly populated areas as well as new service to remote areas outside the reach of traditional providers. The system will provide both diverse geographic coverage and the

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<sup>2</sup> See *Space Exploration Holdings, LLC, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System Supplement*, IBFS File Nos. SAT-LOA-20161115-00118, SAT-LOA-20170726-0110, Memorandum Opinion, Order and Authorization, FCC 18-38 (2018) (granting SpaceX authority to launch and operate the LEO constellation).

<sup>3</sup> See *Application of Space Exploration Holdings, LLC for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System*, IBFS File No. SAT-LOA-20170301-00027 (filed Mar. 1, 2017) (requesting authority to launch and operate the VLEO constellation).

capacity to support a wide range of broadband and communications services for residential, commercial, institutional, governmental and professional users in the United States and globally, including in rural, remote, and unserved areas. The combination of ubiquitous coverage, immense capacity, and relatively low orbits will allow the SpaceX system to deliver next-generation consumer services with latency far lower than geostationary orbit-based satellite offerings.

**II. THE COMMISSION SHOULD NOT ARTIFICIALLY CONSTRAIN THE DEPLOYMENT OF FSS EARTH STATIONS IN THE 50.4-51.4 GHZ BAND, AND INSTEAD SHOULD PROMOTE THE DEVELOPMENT AND DEPLOYMENT OF INNOVATIVE, NEXT-GENERATION SERVICES BY PROVIDING SPECTRUM ACCESS ON A CO-EQUAL BASIS.**

SpaceX urges the Commission to adopt “broader and more balanced sharing between the services on a true co-primary basis” in the 50.4-51.4 GHz band.<sup>4</sup> Despite the existing co-primary FSS, fixed, and mobile allocations in the band, this band is essentially greenfield spectrum that is not actively under development for 5G use by terrestrial wireless operators.<sup>5</sup> Next-generation satellite broadband providers, including SpaceX, have applications on file with the Commission to use this band for, among other things, critical, advanced earth stations to support NGSO satellite constellations that will deliver high-bandwidth, low-latency broadband, to the entire U.S. The SpaceX system in particular is focused on a consumer-based broadband offering, and as a result must account for a diffuse customer base throughout the country. Providing robust broadband connectivity to the entire U.S. requires that FSS operators such as

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<sup>4</sup> Third FNPRM at ¶ 93.

<sup>5</sup> The 50.4-51.4 GHz band is allocated to, but not in use by, FSS and terrestrial wireless operations and has not been identified as a critical 5G band. In contrast, the 24, 28, and 39 GHz bands previously authorized for flexible use in the *Spectrum Frontiers* proceeding were already in use by terrestrial operators and had been identified as near-term 5G bands, as evidenced by carriers’ and equipment manufacturers’ investments in developing this spectrum and carrier acquisitions of incumbent 24, 28, and 39 GHz licensees.

SpaceX be able to locate their gateways at sites with reliable power and access to Internet points of presence, and these sites are often not rural. Adopting a broader, more truly co-primary sharing framework between FSS and terrestrial wireless uses of the 50.4-51.4 GHz band would best facilitate development and deployment of all next-generation broadband services, reflect the Commission’s ongoing commitment to promulgating technologically neutral rules for the use of spectrum, and enable the market to dictate the highest and best use of the as-yet untapped spectrum resources in this band.

In the Third FNPRM, however, the Commission proposes to adopt rules permitting licensing of individual FSS earth stations in the 50.4-51.4 GHz band using criteria “identical to those applicable in the 24.75-25.25 GHz band.”<sup>6</sup> These criteria would: limit FSS earth station deployments in the band to no more than three per county, and 15 per Partial Economic Area (“PEA”); limit the aggregate population covered by the power flux density (“PFD”) contours of all 50.4-51.4 GHz FSS earth stations operating in a given county; Prohibit any 50.4-51.4 GHz FSS earth station’s  $-77.6 \text{ dBm/m}^2/\text{MHz}$  PFD contour (“PFD Contour”) from covering any major event venue, urban mass transit route, passenger railroad, or cruise ship port, or any roads classified by the Federal Highway Administration as an “Interstate, Other Freeways and Expressways, or Other Principal Arterial;” and require the FSS operator to coordinate with any UMFUS licensees in the area.<sup>7</sup> This proposal rests on the assumption that there will be the same level of terrestrial wireless investment and build-out of 5G deployment in the 50.4-51.4 GHz band as in the other bands subject to these earth station deployment limitations, including the 24, 28, and 39 GHz bands. This proposal also assumes that the propagation characteristics of these

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<sup>6</sup> Third FNPRM at ¶ 94.

<sup>7</sup> 47 C.F.R. § 25.136(g)(4).

higher frequencies match those of the lower bands. These assumptions are not borne out by the current marketplace. While the 24, 28, and 39 GHz bands were already in use for terrestrial operations and had been identified specifically by terrestrial interests as important for 5G development and deployment, there is no corresponding evidence of significant terrestrial interest or investment in the 50.4-51.4 GHz band. This may be, at least in part, because the characteristics of this band mean that signals do not travel as far. While this quality may be suboptimal for terrestrial wireless use, it could make it ideal for more robust spectrum sharing. In fact, as the Commission has noted, FSS operators, including SpaceX, that are actively seeking to use this spectrum to bring advanced satellite-based broadband services to market may be able to better co-exist with terrestrial broadband, should that technology eventually develop at this frequency range.<sup>8</sup> In light of this, the Commission should not unduly apply its presumptions about lower bands here, and should not prescriptively constrain the ability of all next-generation services, both terrestrial and satellite-based, to make use of the 50.4-51.4 GHz spectrum to bring advanced broadband services to market.

As satellite operators have shown, with physical shielding and thoughtful placement, gateway earth stations can be sited in urban, suburban, and exurban locations without causing

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<sup>8</sup> See Third FNPRM at ¶ 93 (citing IBFS File Nos. SAT-LOA-20160622-00058, as amended by IBFS File No. SAT-AMD-20170301-00030 (The Boeing Company); SAT-MOD-20160624-00060 and SAT-AMD-20170301-00026 (O3b Limited); SAT-LOI-20170301-00023 (Telesat Canada); SAT-LOI-20170301-00031 (WorldVu Satellites Limited (OneWeb)); SAT-LOA-20170301-00027 (Space Exploration Holdings, LLC (SpaceX)); SAT-LOA-20170301-00028 (The Boeing Company) (application for a separate system including both low-Earth orbit (LEO) and highly inclined orbit NGSO satellites); SAT-LOA-20161115-00112 and SAT-AMD-20170301-00029 (Theia Holdings A, Inc.), SAT-LOA-20170621-00092, as amended by SAT-AMD-20170908-00128 (Hughes Network Systems, LLC.), SES-LIC-20170807-00876 through SES-LIC-20170807-00895).

harmful interference to terrestrial operations.<sup>9</sup> This reaffirms the Commission's previous conclusion in this proceeding that these techniques can mitigate potential interference to terrestrial operations from FSS Earth-to-space gateway transmissions.<sup>10</sup> The nature and design of the SpaceX system gateways further demonstrate that the proposed siting restrictions can—and must—be relaxed without negatively impacting 5G development and deployment in the event terrestrial operators are eventually able to develop equipment and standards for the use of the 50.4-51.4 GHz band. The SpaceX system will employ smaller, more geographically dispersed gateways than used in typical FSS deployments with a very few large gateways sited at satellite farms. In addition, many of these gateways are likely to be deployed on rooftops or other higher structures, away from 5G transmitters, which are expected to be deployed in small cells at or near street level and will likely employ some degree of downtilt. The use of higher elevation angles and likely vertical separation between the SpaceX gateways and terrestrial base stations illustrates the degree to which the 50.4-51.4 GHz band could be shared between FSS users and terrestrial operators, and the geographic dispersion of the SpaceX gateways underscores the need to provide FSS users flexibility in siting their earth stations in accordance with their co-primary status in the band.

The Commission should therefore reconsider the proposed restrictions on the deployment of FSS earth stations in favor of broader co-primary sharing between FSS and terrestrial users in the 50.4-51.4 GHz band. The Commission should avoid implementing any numerical limitation on the number of FSS earth stations in a given county or PEA. Instead of applying the strained

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<sup>9</sup> See, e.g., Letter from John P. Janka, Counsel to ViaSat, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 *et al.* (filed July 7, 2016); Letter from John P. Janka, Counsel to ViaSat, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 *et al.* (filed Apr. 12, 2017).

<sup>10</sup> See *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services et al.*, GN Docket No. 14-177 *et al.*, Report and Order and Further Notice of Proposed Rulemaking, FCC 16-89 (2016).

compromise reached for the 28 GHz band, the Commission should recognize the different circumstances here and adopt the previous proposal by satellite operators to permit the PFD Contour of FSS earth stations in a given county to cover: (1) 0.1% of the population of a county with more than 600,000 residents, (2) 600 residents in a county with between 6,000 and 600,000 residents, and (3) 10% of the population in a county with fewer than 6,000 residents.<sup>11</sup> Although the Commission declined to implement this sharing regime in the 24, 28, and 39 GHz bands, as demonstrated above, the 50.4-51.4 GHz band is greenfield spectrum with significantly different physical characteristics and thus materially distinct from the bands previously considered in this proceeding. The Commission would therefore best serve the public interest by adopting a mechanism that allows several new technologies to flourish by enabling sharing between FSS and terrestrial users of the band on a more co-equal and technologically neutral basis. Adoption of this proposal will make 50.4-51.4 GHz a true innovation band and best facilitate the market's determination of the highest and best use of this spectrum.

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<sup>11</sup> See Letter from Jennifer A. Manner, Senior Vice President, Regulatory Affairs, EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, Susan H. Crandall, Associate General Counsel, Intelsat Corporation, Petra A. Vorwig, Senior Legal & Regulatory Counsel, SES Americom, Inc., Leslie Milton, Senior Counsel, Regulatory Affairs, Telesat Canada, Giselle Creeser, Director, Regulatory, Inmarsat, Inc., Audrey L. Allison, Senior Director, Frequency Management Services, The Boeing Company, Suzanne Malloy, Vice President, Regulatory Affairs, O3b Limited, and Mariah Shuman, Senior Director, Regulatory Affairs, WorldVu Satellites Ltd. d/b/a OneWeb to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 *et al.* (filed Oct. 19, 2017).

### III. CONCLUSION.

For the foregoing reasons, the Commission should not adopt its proposed limitations on the deployment of FSS earth stations in the 50.4-51.4 GHz band, and instead should promote the development and deployment of next-generation satellite and terrestrial wireless services by providing such services access to this spectrum on a co-equal basis as a true innovation band.

Respectfully submitted,

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