

May 26, 2016

BY ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: Core Principles for a Successful Sharing Regime Between UMFU and FSS Operators in the 28 GHz Band; *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, GN Docket No. 14-177, IB Docket Nos. 15-256 and 97-95; RM-11664; and WT Docket No. 10-112

Dear Ms. Dortch:

EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, Inmarsat, Inc., O3b Limited, SES Americom, Inc., ViaSat, Inc., and WorldVu Satellites Ltd./OneWeb (collectively, “Broadband Satellite Operators”) hereby submit the principles discussed below for the FCC to adopt as it crafts the regime under which satellite services and terrestrial mobile services will share the spectrum from 27.5-28.35 GHz (“28 GHz band”).¹ The absence of a meaningful, balanced, and co-primary sharing regime could disrupt reasonable expectations of the Broadband Satellite Operators and severely curtail the provision of high-throughput broadband satellite services to U.S. customers.

The Broadband Satellite Operators recognize the interest of potential new Upper Microwave Flexible Use (“UMFU”) licensees in being able to deploy 5G networks over the next decade in areas where demand for 5G services is likely to be high. However, prospective UMFU licensees must also recognize the countervailing entitlement of Fixed-Satellite Service (“FSS”) operators (whose spacecraft provide both domestic and international service) to the predictability of co-primary status in the band. Contrary to the repeated assertions of the wireless industry,² FSS is a primary service under both the International and the U.S. Table of Frequency Allocations. Moreover, the twenty-year-old regulatory framework that governs domestic

¹ Many of these same sharing principles would also be relevant to the spectrum from 37.5-40.0 GHz (“38 GHz band”). However, because the record in this proceeding with respect to that band is much less complete, the Broadband Satellite Operators urge the FCC to defer adoption of any rules for the 38 GHz band at this time.

² See, e.g., Letter from Gregory M. Romano (Verizon) to Marlene H. Dortch, GN Docket No. 14-177, at 2 (May 23, 2016) (“It also remains important to recognize that satellite use of the 28 GHz band is a secondary allocation to terrestrial services, and that the Commission should be careful to ensure that new satellite earth stations are not allowed to cause interference to 5G devices in areas where they are likely to be used.”); Letter from Scott K. Bergmann (CTIA) to Marlene H. Dortch, GN Docket No. 14-177 et al. (May 20, 2016) (submitting a proposal “responding to satellite operators’ stated needs for continued FSS expansion and operation on a secondary basis”).

licensing of the 28 GHz band gives the FSS express licensing priority over any terrestrial mobile service.³ The Broadband Satellite Operators have collectively invested billions of dollars in reliance on this existing legal regime, an investment that has ensured that all areas of the U.S. have access to cost-effective, reliable broadband services. They have reasonable and settled expectations that this regime will not be changed in a manner that could disrupt their current operations and near-term plans.

The Broadband Satellite Operators are in the process of launching at least four new geostationary broadband satellites operating in the 28 GHz band in the next three years,⁴ all of which will be capable of providing service to the entire United States, including areas deemed “underserved” by the FCC, small and large businesses, and critical government users including the military and public safety agencies. Other geostationary and non-geostationary orbit satellites are either currently operating in the 28 GHz band,⁵ or are under design or beginning construction. Some of these include new non-geostationary orbit constellations that promise to bring additional low latency broadband connectivity to U.S. customers, including in the most northern reaches of the country.⁶

By contrast, the wireless industry has made clear that “the primary opportunity for mmW deployment is in areas with the greatest population density . . . due to the fact that mmW spectrum is unlikely to deliver extensive coverage in a market but instead will be best suited to providing capacity via small cells and backhaul, particularly in densely populated areas.”⁷ In addition, the wireless industry concedes that 5G “technologies and services are at an early stage of development,” and anticipates fairly minimal deployment requirements – *i.e.*, “10 connections per 10,000 in population by the end of the license term” for mobile operations – that would be “tolled until at least two manufacturers have certified equipment to operate” in the band.⁸ Because 5G operations are still several years from service introduction and will not be deployed outside densely populated areas, establishing a co-primary sharing environment now will ensure

³ See *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, ¶ 44 (1996) (in adopting the 28 GHz band plan, stating that FSS would have “licensing priority vis-à-vis any third service allocated domestically or internationally in the band” (emphasis added)). See also 47 C.F.R. § 25.202(a)(1) n.2 (stating that “FSS is secondary to LMDS in this band”).

⁴ These satellites include EchoStar XIX, SES-15, ViaSat 2, and ViaSat 3.

⁵ O3b, currently operating a twelve-satellite non-geostationary constellation, will launch eight additional satellites by 2018 to accommodate growing demand. See also system authorizations listed in footnote 11, *infra*.

⁶ OneWeb will launch 10 pilot satellites in early 2018 and begin launching the rest of its constellation later that year and throughout 2019, ready to begin commercial services in 2020.

⁷ See Letter from Scott K. Bergmann (CTIA) to Marlene H. Dortch, GN Docket No. 14-177 *et al.*, at 2 (May 20, 2016).

⁸ See Letter from Brian M. Josef (CTIA) to Marlene H. Dortch, GN Docket No. 14-177 *et al.*, at 2-3 (May 24, 2016).

that UMFU systems can be designed from the beginning to accommodate current and future FSS operations.

The Broadband Satellite Operators understand the FCC's desire to make the 28 GHz band available for UMFU operations. However, it would be contrary to the public interest for the FCC to do so at the expense of current and future broadband satellite deployment and operations. To ensure that the regulatory regime for use of this valuable spectrum is fair to all parties, the Broadband Satellite Operators urge the FCC to implement the following principles for co-primary sharing between UMFU and FSS operators.

1. The UMFU Must Protect Co-Primary FSS Space Stations Against Aggregate Interference: FSS operators need – and are entitled to – protection for their space stations against aggregate interference from terrestrial UMFU transmissions. The combined energy sent skyward toward satellites by UMFU operations in the 28 GHz band can result in harmful interference to broadband satellite service for U.S. customers. Failure to adopt an aggregate emission limit could result in service degradation and outages to commercial customers and critical public service users, including the public safety community, utilities, and the U.S. government.

Moreover, if not appropriately addressed by suitable UMFU operating constraints, the aggregate uplink interference from UMFU operations within the United States could well significantly exceed relevant international limits.⁹ Failure to adopt rules limiting the potential for harmful aggregate interference into 28 GHz band FSS space stations would violate the legal regime under which FSS space stations are entitled to protection from harmful interference from new spectrum uses. As discussed above, under both the International and U.S. Table of Frequency Allocations, FSS is a co-primary service in the 28 GHz band. Together, these international and domestic allocations entitle FSS space stations – both those licensed by the United States and those licensed by other administrations that might receive interference from U.S.-licensed operations – to interference protection as a primary service.

Moreover, the FCC has expressly authorized or granted market access to numerous space stations operating in the 28 GHz band with no limits on their use or interference protection vis-à-vis the terrestrial mobile service. To the contrary, under the 28 GHz band plan, those space stations have priority over new terrestrial services such as UMFU.¹⁰ To the extent the FCC has limited the interference protection afforded to satellite services in the 28 GHz band, this has been explicitly linked only to the fixed Local Multipoint Distribution Service (“LMDS”).¹¹ Therefore, FSS operations in the 28

⁹ See ITU-R Recommendation S.1432-1, Recommends 4 (regarding maximum degradation due to interference at frequencies below 30 GHz).

¹⁰ See footnote 3, *supra*.

¹¹ See, e.g., *Inmarsat Mobile Networks Inc.*, 30 FCC Rcd. 2770, ¶ 12 (Int'l Bur. 2015) (“We determine that Inmarsat-5 F2 may use the 27.5-28.35 GHz frequency band for its Lino Lakes gateway operations on a non-

GHz band should retain their co-primary status if the FCC introduces a new mobile service to the band. Indeed, while the FCC theoretically could change the domestic table of frequency allocations – something that was not proposed in the Notice of Proposed Rulemaking in this proceeding – it would still be subject to an international treaty obligation to afford interference protection to internationally-authorized space stations in the 28 GHz band.

Accordingly, based on the domestic and international table of allocations and the FCC's own licensing regime, the United States has a legal obligation to ensure that FSS space stations operating in accordance with the table of allocations are protected from terrestrial mobile interference. As such, the FCC must adopt rules that ensure there is protection from aggregate interference into FSS space stations. As demonstrated in the record,¹² in order to protect 28 GHz band FSS space station operations, the FCC should require that aggregate emissions radiated skyward by all UMFU operations in the 28 GHz band shall be limited to an EIRP of 16.5 dBm/MHz per 1000 km². To ensure that this rule is met, the FCC should adopt a rigorous enforcement regime. This could include, for example, requiring each UMFU licensee to file an annual certification to demonstrate that operational base stations and user equipment in its licensed area do not exceed the aggregate interference limit, and requiring all UMFU equipment and devices to be designed with the ability to implement additional limitation of power radiated skywards if necessary to ensure compliance with the aggregate interference limit.

2. Grandfathering and Protection of FSS Earth Station Sites: As noted above, numerous satellite networks are currently operating, or are being planned for operation, in the 28 GHz band in reliance on the existing domestic and international allocations and the FCC's twenty-year-old band plan. In order to ensure that U.S. customers can continue to receive cost-effective, high-quality broadband satellite services in this band, it is essential to grandfather as co-primary all existing individually-licensed 28 GHz band FSS earth stations, as well as all such earth stations that are applied for or licensed up until the FCC auctions the 28 GHz band for UMFU use.

Failure to provide this protection would be devastating to satellite customers, as well as to operators who have satellites under construction and need certainty as to their deployments during the window of time before the UMFU auction when there are no terrestrial licensees with which to coordinate new entry. In fact, were the FCC to decide not to grandfather these earth stations, the resulting uncertainty could deny valuable

interference basis *with respect to LMDS*, and Inmarsat may not claim protection against harmful interference from LMDS operators.”) (emphasis added). See also Stamp Grant, IBFS File No. SAT-LOI-20080107-00006, Condition 2 (Aug. 18, 2009) (ViaSat 1); Stamp Grant, IBFS File No. SAT-LOI-20130319-00040, Condition 12 (Dec. 12, 2013) (ViaSat 70° W.L.); Stamp Grant, IBFS File No. SAT-LOI-20140204-00013, Condition 11 (June 18, 2014) (ViaSat 89° W.L.); Stamp Grant, IBFS File No. SAT-LOI-20141029-00118, Condition 8 (Jan. 22, 2015) (O3b NGSO system); Stamp Grant, IBFS File No. SAT-MOD-20141210-00127, Condition 7 (June 23, 2015) (EchoStar XIX).

¹² See Letter from Jennifer A. Manner to Marlene H. Dortch, GN Docket No. 14-177 *et al.* (May 12, 2016).

innovative services to U.S. customers. Furthermore, to encourage the co-location of satellite earth stations where feasible, individually-licensed 28 GHz band earth station licensees should be permitted to add antennas to any grandfathered sites.

Finally, the FCC should adopt a rule that requires UMFU licensees to design their networks to accept interference from these grandfathered and co-located individually-licensed FSS earth station locations.

3. Accommodating New FSS Earth Stations: While grandfathering will protect existing and planned earth station sites and provide some certainty for FSS operations going forward, grandfathering does not eliminate the need for new individually-licensed FSS earth station sites to be authorized to accommodate future FSS growth and evolution. Each satellite is unique and has discrete technical requirements for earth station siting. Additionally, new satellite designs and an increase in demand will require an increase in the number of supporting individually-licensed earth stations. The FCC must ensure that its rules expressly allow FSS operators to deploy new earth station facilities on a co-primary basis (and add antennas in the future as needed) and preclude any party from exercising a unilateral veto or acting as a gatekeeper to deployment in areas where it is not yet operating. Failure to do so will render FSS operators unable to meet the growing demand for broadband satellite services, harming U.S. customers.
4. There Must Be a Safe Harbor for New FSS Deployments: The FCC also should adopt a safe harbor for the deployment of new individually-licensed earth stations.¹³ For this purpose, the FCC should identify census tracts with a suitable population density, outside the dense urban cores that the wireless industry has targeted for UMFU deployment but also where supporting terrestrial infrastructure required for earth station operation is readily and economically available. FSS operators should presumptively be entitled to deploy individually-licensed earth stations in those areas without coordination as long as there is no existing UMFU deployment and where doing so is not likely to materially impair UMFU deployment already planned. Given the wireless industry's express intention to deploy in the 28 GHz band only sparsely (*e.g.*, "10 connections per 10,000 in population") and only in the most densely populated areas,¹⁴ this should not impose an undue burden on UMFU operations.
5. Auctions and Secondary Markets Are Not Appropriate for Earth Station Licensing: Putting aside the question of whether auctions are permissible under the Orbit Act for purposes of awarding spectrum rights with respect to satellite networks,¹⁵ it would be

¹³ To be clear, this safe harbor would be in addition to any other rules adopted to accommodate deployment of new FSS earth stations.

¹⁴ See text accompanying footnotes 7 and 8, *supra*.

¹⁵ See Comments of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Alta Wireless, Inc., GN Docket No. 14-177 *et al.*, at 34-38 (Jan. 27, 2016).

impossible for the FCC to adopt an auction regime that would provide earth station operators the ability to effectively compete for access to 28 GHz band spectrum. Unlike terrestrial deployments, the value of spectrum to support earth station deployments is not measured in dollars per MHz-pops. Individually-licensed earth stations are a basic part of the satellite communications system. Moreover, earth stations do not require rights to large geographic areas, such as counties or Partial Economic Areas, to operate effectively and avoid having an adverse effect upon UMFU operations. Requiring earth station operators to compete against UMFU licensees for the rights to operate a single earth station in an overly large geographic area would make it virtually impossible for the earth station operator to ever be successful in an auction. Similarly, since FSS broadband operators may be seen as competitors, UMFU licensees would be highly unlikely to enter into secondary lease agreements with FSS earth station operators, absent meaningful and appropriate safeguards. Accordingly, the FCC should not rely on auction or secondary market requirements for FSS earth station operators to access the 28 GHz band.

6. The FCC Should Allow More Than One Year For 28 GHz FSS Earth Station Deployment: At present, the FCC's rules establish a presumption that each individually-licensed earth station will be constructed and begin operations within 12 months of licensing.¹⁶ Given the changes in the current operating environment that will occur with the introduction of UMFU in the 28 GHz band, the Broadband Satellite Operators recommend that the FCC waive the application of this requirement with respect to the 28 GHz band. This waiver will facilitate effective sharing between co-primary FSS and UMFU operations in the 28 GHz band, by giving operators of both systems necessary certainty about future FSS operations.

A strict application of this rule in the new sharing environment would be inconsistent with the timetable for deploying earth stations for 28 GHz satellites that are more than one year away from launch and that need to plan for sharing with the UMFU. An FSS operator must determine the locations of individually-licensed earth stations prior to beginning construction of the new space station they will support. Once those design decisions have been finalized, it takes several years to construct and launch the satellite and bring it into operation. During that interim time period, FSS satellite operators need certainty that the locations incorporated into a satellite's design will be available for earth station deployment once the system is ready for operation. This is true for 28 GHz satellites that are being constructed for launch in the next five years, as well as for future 28 GHz satellites.

Requiring construction and commencement of operations of individually-licensed 28 GHz FSS earth stations within one year of licensing would undermine that needed certainty by effectively precluding an FSS operator from securing an earth station license—and thus establishing its co-primary rights in the necessary area—for a period of

¹⁶ See 47 C.F.R. § 25.133(a)(1) (“Construction of the earth station must be completed and the station must be brought into operation within 12 months from the date of the license grant except as may be determined by the Commission for any particular application.”).

several years after the point when that earth station location has been built into the system design. Particularly since the operator of the space station with which such earth stations would communicate must post a performance bond to ensure deployment within five years, there is no reason to delay the corresponding licensing of earth station facilities or require that they be deployed on a more accelerated timeframe. In addition, identifying earth station sites well in advance will also give UMFU operators certainty that could facilitate the planning of their networks. Accordingly, the FCC should waive the application of Section 25.133(a)(1) to the 28 GHz band to allow individually-licensed FSS earth station licensees in the 28 GHz band five years after licensing to construct those facilities and begin operations.

* * *

Chairman Wheeler has urged the satellite and wireless industries to work cooperatively to ensure that the critical spectrum resources being examined in this proceeding can be used efficiently and intensively by both industries. Indeed, spectrum sharing requires cooperation by all parties to ensure room for every authorized service to operate and grow as technology and services evolve.¹⁷ In that spirit, we believe that the principles discussed above appropriately balance the desire to promote new terrestrial 5G mobile services while also protecting the interests of FSS operators currently using and planning to use the 28 GHz band. The result should lead to intensive use of this valuable spectrum to the benefit of U.S. consumers across the country. We urge the FCC to implement these principles.

Sincerely yours,

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¹⁷ See Remarks of Chairman Wheeler, Spectrum Frontiers Workshop, FCC, Washington, DC (Mar. 10, 2016) (describing sharing between satellite and terrestrial wireless as being “a two-way street,” and expressing “hope that the satellite industry and the mobile industry would get together and work on how they can coexist because the future of spectrum in the 21st century is a future of sharing” and that “there are expectations on the mobile industry to meet the satellite interests in a fair and open and equal manner”), *video recording available at* <https://www.fcc.gov/news-events/events/2016/03/spectrum-frontiers-workshop>.

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Page 8 of 8

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