

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of

**IMPLEMENTING EARTH STATION SITING
METHODOLOGIES**

IB Docket No. 17-172

**COMMENTS OF ECHOSTAR SATELLITE OPERATING
CORPORATION AND HUGHES NETWORK SYSTEMS, LLC**

EchoStar Satellite Operating Corporation and Hughes Network Systems, LLC (collectively, “EchoStar”) hereby respond to the Public Notice¹ issued by the International Bureau calling for comment on the appropriate methodology for implementing earth station siting rules adopted by the Commission in the *Spectrum Frontiers* proceeding with respect to the 27.5-28.35 GHz (“28 GHz”) band.² Those rules permit up to three Fixed-Satellite Service (“FSS”) earth stations to be located in the county licensed to an Upper Microwave Flexible Use Service (“UMFUS”) operator without providing interference protection as long as the interference zones around those stations do not, in the aggregate, cover more than 0.1 percent of the population in that county. EchoStar welcomes the opportunity to provide input as the Bureau considers how best to implement these rules in a way that will allow FSS operators to continue to deploy their networks that provide much-needed broadband services in underserved areas of the

¹ See Public Notice, “International Bureau Seeks Comment on Implementing Earth Station Siting Methodologies,” DA 17-606 (June 21, 2017) (“Public Notice”). Note that these comments relate solely to rules applicable in the 28 GHz band.

² See 47 C.F.R. § 25.136(a); *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, 31 FCC Rcd. 8014 (2016) (“*Spectrum Frontiers Order*”).

United States, while also limiting the effect of that deployment on UMFUS operations to a reasonable extent.

EchoStar is a leader in the technology sector, as well as the largest commercial geostationary satellite operator in the United States and the fourth largest commercial geostationary operator in the world. EchoStar has a fleet of twenty-six owned, leased or managed satellites in the FSS, Broadcasting-Satellite Service (“BSS”) and Mobile-Satellite Service (“MSS”). It uses individually licensed earth stations operating in the 28 GHz band, each supporting service to tens of thousands of customers, as an integral part of a satellite network that provides advanced broadband services to over one million subscribers, many in the most rural and remote parts of the United States.

Moreover, that network continues to grow. EchoStar recently launched a new satellite (Jupiter 2) to support HughesNet Gen5, the first and only U.S. satellite Internet service to offer or exceed Commission-defined broadband speeds – 25 Mbps download and 3 Mbps upload – from coast-to-coast, which attracted over 100,000 subscribers in the first two months of commercial service.³ It also recently filed an application for a new satellite (HNS 95W) that will operate in Ka-band (including 28 GHz) and Q/V band (40.2-42.0/47.2-51.4 GHz) spectrum.⁴ This state-of-the-art broadband satellite will provide service at speeds well in excess of the Commission-defined standard. The addition of the HNS 95W satellite to the EchoStar fleet of spacecraft will greatly enhance broadband connectivity across the continental United States and the Americas, especially in areas unserved or underserved by terrestrial broadband services to

³ See Press Release, “HughesNet Gen5 Surpasses 100,000 Subscribers in Just Two Months” (June 5, 2017), available at <http://echostar.com/Press/Newsandmedia/HughesNet%20Gen5%20Surpasses%20100000%20Subscribers%20In%20Just%20Two%20Months.aspx>.

⁴ Application of Hughes Network Systems, LLC, IBFS File No. SAT-LOA-20170621-00092.

support 5G and other critical services to consumers, businesses and the government.

Accordingly, EchoStar has a significant interest in ensuring that the Commission adopts appropriate and flexible procedures for implementation of the earth station siting rules applicable to the 28 GHz band.⁵

As the Commission is aware, several parties (including EchoStar) have filed petitions for reconsideration of the *Spectrum Frontiers Order* that include requests for revisions to the Commission's earth station siting rules.⁶ The Public Notice explicitly does not address those petitions, and EchoStar's submission of these comments should in no way be viewed as a waiver of the arguments made in support of reconsideration, which EchoStar continues to believe is essential. Given that the Commission will need a methodology for determining the impact of a proposed FSS earth station even if the siting rules are revised, the issues raised in this proceeding will be relevant regardless of how the Commission rules on reconsideration. Accordingly, EchoStar submits the following information so the Commission can make a fully informed decision.

DISCUSSION

The earth station siting rules in Section 25.136(a) provide that FSS earth stations operating in the 28 GHz band will not be required to provide additional interference protection to UMFUS operations if the interference zones of up to three stations in each county do not, in the aggregate, cover more than 0.1 percent of the population of that county. For this purpose, the interference zone is defined as the area in which the earth station generates a power flux-density

⁵ Although EchoStar has no current plans for operations in the 39 GHz band, it supports applying earth station siting rules in that band consistent with those applied to the 28 GHz band to the extent possible.

⁶ See Public Notice at 2 n.7 (citing Joint Petition for Reconsideration of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Inmarsat, Inc., GN Docket No. 14-177 (Dec. 14, 2016)).

(“PFD”) at 10 meters above ground level of greater than or equal to -77.6 dBm/m²/MHz. The Public Notice follows through on the Commission’s directive to seek public comment on various issues with respect to implementation of that rule.⁷ For ease of reference, the discussion below follows the outline of issues presented in the Public Notice.

1. Earth Station Location and Antenna Pointing

In defining the PFD contour for a proposed 28 GHz earth station, the Commission should use the operating parameters specified in the underlying application. For operators of geostationary orbit (“GSO”) satellites such as EchoStar, this would include designation of the specific orbital location of each satellite with which that earth station would communicate. If an application is limited in this way, the analysis of the resulting interference zone should reflect that fact rather than extending the potential impact over some predetermined but essentially arbitrary arc. Applicants that want or need the freedom to communicate across a wider range of directions would be free to do so, with the PFD contour reflecting the potential for interference over a wider area. As the Commission recognizes, taking such antenna pointing into account would maximize the flexibility afforded to earth station applicants while having minimal effect on UMFUS operators.⁸

2. Computing Contours

a. Propagation Model

In order to compute the PFD contour, the Commission must identify an appropriate propagation model. The International Telecommunication Union (“ITU”) has developed two potentially useful models: Recommendation ITU-R P.452, which contains a prediction method

⁷ See *Spectrum Frontiers Order* ¶ 54 n.120.

⁸ See Public Notice at 2.

for the evaluation of interference between stations on the surface of the Earth at frequencies from about 0.1 GHz to 50 GHz;⁹ and Recommendation P.[Clutter], which has been developed in the ITU study group process for use in estimating loss through clutter at frequencies between 30 MHz and 100 GHz.¹⁰ EchoStar does not oppose the use of these recommendations. However, as with any model, they may not accurately capture the true impact that a proposed FSS earth station could be expected to have, and therefore applicants should be allowed to supplement them as appropriate.

Accordingly, EchoStar proposes that applicants should also be allowed to submit an analysis based on reasonable assumptions where justified by conditions of their particular deployment. This would include, for example, using a free space path loss model with an appropriate adjustment for enhanced attenuation close to the earth station antenna (such as from shielding or terrain). Allowing such alternative showings in appropriate circumstances would provide an additional layer of flexibility for FSS operators while still capturing their potential impact on the population in UMFUS licensed areas.

b. Mechanics of Computing the PFD Contour

Earth station applicants should be allowed to use any reasonable method to compute the PFD contour. This could include, for example, using an off-axis antenna gain mask such as those found in section 25.209 of the Commission's rules. However, at present there is no mask applicable to FSS operations in the 28 GHz band. Alternatively, as suggested by the Public Notice, applicants should be allowed to use measured or simulated antenna gain patterns to

⁹ See ITU-R, "Prediction Procedure for the evaluation of interference between stations on the surface of the earth at frequencies above about 0.1 GHz," Recommendation ITU-R P.452-16 (July 2015), *available at* <https://www.itu.int/rec/R-REC-P.452-16-201507-I/en>.

¹⁰ See Working Parties 3K and 3M, "Draft new Recommendation ITU-R P.[Clutter]" (Mar. 30, 2017), *available at* <https://www.itu.int/md/R15-SG03-C-0051/en>.

demonstrate that the PFD contour is smaller than computed using such a mask.¹¹ In order to ensure accuracy of measured data, applicants could be required to follow the procedures in Section 25.132 of the Commission's rules, which apply to verification of transmitting earth station antenna performance for antennas covered by Section 25.209.¹² Applicants that rely on simulations could be required to describe the relevant software and databases used so that other interested parties could validate both the process and the results of the simulation.

c. Consideration of Terrain, Clutter, and Shielding

Earth station applicants should be permitted to take terrain, clutter and shielding into account in their computations of the PFD contour. As the Commission recognized in the *Spectrum Frontiers Order*, such considerations clearly are relevant to the potential impact a proposed earth station could have on the population in a given county, and thus are properly taken into account in the analysis.¹³ RF shielding options may be feasible in certain situations. When feasible and necessary, operators could include a certification that shielding of a certain specification has been installed at an earth station site as part of the certification already required at commencement of operations.¹⁴

3. Determining Population Percentages

a. Level of Detail

In determining the effect of a proposed 28 GHz earth station on the population of a county, the Commission should use data at the greatest level of detail available. In this case, the

¹¹ See Public Notice at 3.

¹² See 47 C.F.R. § 25.132(b).

¹³ See, e.g., *Spectrum Frontiers Order* ¶ 46 and n.102, and Appendix C.

¹⁴ See 47 C.F.R. § 25.133(b)(1).

census block is the most granular level of data available from the U.S. Census Bureau.¹⁵ There is no reason to favor the use of less accurate data when greater detail is available from such an authoritative, reliable, and readily available source.

b. Calculation Method

Even using population data at the greatest level of detail, the PFD contour surrounding a proposed FSS earth station will not exactly conform to the geographic areas used for that data. Obviously, the entire population of a census block that falls entirely within an earth station's PFD contour should be counted toward the 0.1 percent population limit. With respect to those blocks that fall only partially within the contour, the Commission should normally apply the actual area method, under which the ratio of the portion of the census block that falls within the contour to the total area of the census block is applied against the population within that census block, with the result counted against the population impact limitation. This is the most straightforward way to allocate population in a partially-covered block. For this analysis, the Commission should require applicants to use the most recent decennial data available from the U.S. Census Bureau at the time an earth station application is submitted.

Additionally, applicants should be given the flexibility to demonstrate that the population within the contour is less than that derived by the actual area method on a case-by-case basis. While the actual area method is reasonable in census blocks with a somewhat uniform pattern of development, some census blocks, particularly in rural areas, have an uneven distribution of population within the block. It is conceivable that a contour may partially cover a significant portion of a census block that is, in fact, uninhabited. For example, the affected area could

¹⁵ See U.S. Census Bureau, "Standard Hierarchy of Census Geographic Entities" (Oct. 27, 2010), available at <https://www2.census.gov/geo/pdfs/reference/geodiagram.pdf>.

include a lake or a large expanse of farmland. Where the actual area method would yield demonstrably inaccurate results, rigid adherence to the that counting method would needlessly limit FSS earth station deployment options while providing no corresponding benefit to UMFUS operators. In such circumstances, the public interest would be better served by allowing a case-by-case demonstration.

c. *Processing Guidelines*

In processing earth station applications, the Commission could promote collocation by waiving the required population impact analysis when a new 28 GHz earth station is placed within the coordination accuracy limit of a previously licensed 28 GHz earth station. At present, the Commission's rules allow an earth station operator to relocate its antenna without prior authorization within one second of latitude or longitude for stations operating in frequency bands shared with terrestrial systems.¹⁶ Thus, there should be no need for an impact analysis for an earth station placed within this coordination accuracy limit, regardless of whether the applicant is the licensee of the original station or not. Adopting this rule would create a significant incentive for FSS operators to collocate their 28 GHz earth stations, which would also benefit UMFUS operators by concentrating FSS operations into a single area and leaving the remainder of the county undisturbed.

* * *

Adopting appropriate methodologies for implementing the Commission's rules for siting 28 GHz earth stations will provide FSS operators greater certainty and greater flexibility in

¹⁶ See 47 C.F.R. § 25.118(a)(4)(vi) (change in earth station coordinates of up to one degree of arc allowed without prior authorization on notification within 30 days). EchoStar has asked the Commission to consider greater flexibility for earth station operators in a pending rulemaking proceeding. See Comments of EchoStar Satellite Operating Corporation and Hughes Network Systems, LLC, CB Docket No. 16-251, at 8-9 (May 4, 2017).

making deployment decisions, and therefore better enable them to meet the needs of customers throughout the entire United States while also protecting UMFUS operations. EchoStar appreciates the opportunity to contribute to this process, and looks forward to working with the Commission and all interested parties to craft guidelines that best promote the public interest in making productive use of this valuable spectrum band.

Respectfully submitted,

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