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June 10, 2016

BY ELECTRONIC FILING

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

Re: *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., Lockheed Martin Corporation, O3b Limited, SES Americom, Inc., ViaSat, Inc., and WorldVu Satellites Ltd./OneWeb (collectively, “Broadband Satellite Companies”) design, build, operate, and/or are in the process of constructing advanced satellites and/or earth stations to communicate using the 27.5-28.35 GHz band (“28 GHz band”) to provide broadband service to customers throughout the United States and/or elsewhere.¹ In this proceeding, the Broadband Satellite Companies have focused on strategies for sharing in the 28 GHz band between the Fixed-Satellite Service (“FSS”) and the proposed Upper Microwave Flexible Use (“UMFU”)

¹ The Broadband Satellite Company operators and others have invested many billions of dollars in advanced geostationary and non-geostationary 28 GHz satellite systems serving U.S. and global customers and network operations that rely on the existing regulatory and operating environment.

service. During this process, some have proposed a rule under which future FSS earth stations² operating in the 28 GHz band would be restricted to pre-determined locations, such as a single site in each county, and subject to very restrictive operational limitations. Essentially, this would require co-location for any earth station operator who wished to locate in a given county. As discussed below, such an approach would present significant technical issues which would adversely affect the provision of critical broadband services to millions of customers throughout the United States, including commercial and U.S. government customers (*e.g.*, the U.S. military) in the air, at sea, and in the most rural and remote locations, as well as more densely populated areas, where broadband satellite operators compete with terrestrial broadband services.³

Earth Station vs. Terrestrial Antenna Facilities. The Broadband Satellite Companies understand that the Commission may be considering earth station co-location requirements based on its experience with terrestrial networks. Unfortunately, the two operating environments are not comparable and require very different approaches. For example, terrestrial antennas are mounted vertically, and multiple terrestrial operators can and often do install their respective antennas on a single tower, pole, or other structure. Earth stations, by contrast, have to point toward the sky, making vertical co-location impossible. In the terrestrial context, operators must deploy transmitters on a fairly dense grid in order to support mobile services. In many cases, a third party acquires the real estate or pole attachment rights, arranges for supporting power and connectivity, and builds out infrastructure over large areas for use by terrestrial operators. The business plan of such third parties not only contemplates usage by multiple operators, but depends upon such usage in order to achieve the economies of scale necessary to justify their investment. By contrast, an FSS operator's earth station siting is driven by factors that are unique to each operator, including satellite design, network design, or customer requirements. While a small number of FSS operators maintain large facilities hosting multiple antennas, most FSS earth station facilities are widely dispersed throughout the U.S. and host relatively few earth stations, and thus create far fewer incentives for third party site development. As a result, there is no basis for assuming that co-location of 28 GHz FSS earth stations would be a practical option in most cases. Mandating that earth stations be co-located and placed in pre-designated areas that bear no relation to technical or customer needs will severely undermine the satellite industry's ability to serve the Commission's broadband connectivity objectives.

Power Flux-Density Limit. There are several problems with grouping FSS earth stations at limited locations per UMFU license area. Presumably, this would require the imposition of a power flux-density ("PFD") limit at each 28 GHz earth station co-location site. Foremost, applying a PFD limit *retroactively* on existing earth stations, as the wireless industry has

² The Broadband Satellite Companies understand that the proposal would not apply to FSS earth stations that are licensed or otherwise have applications on file prior to a defined grandfathering date.

³ In addition, such a restriction could affect opportunities for the U.S. to access spectrum/orbital resources of both U.S. and non-U.S.-licensed satellites if the earth station operator cannot reach an arrangement in the desired geographical area. This is a particular concern in the far eastern and far western parts of the geostationary satellite orbital arc, where there would be fewer desirable U.S. locations for earth stations on the East and West coasts.

proposed⁴ is not consistent with past Commission practice and its stated intent to grandfather deployed FSS earth stations. Applying such a PFD retroactively would require existing operational and physical modifications of earth station operations and would affect the provision of existing services to customers. With respect to *future deployment* of earth stations, codifying such a single-entry PFD restriction in a rule would effectively limit FSS deployment to one 28 GHz band antenna at each earth station location.⁵ Such a limit would not only prevent the original earth station operator from deploying additional antennas at the site, but would also make use of that site by other FSS operators impossible and thus defeat the stated purpose of establishing a single location for deployment by multiple 28 GHz band antennas (*i.e.*, forced co-location). Even with a significantly higher PFD limit, forcing multiple earth station operators into one facility could result in a scenario in which the addition of a new antenna would force the existing operator(s) to reduce power, thereby compromising their ability to provide service to their customers and reducing the incentive to accommodate other operators.

Site Infrastructure. Different FSS operators have different requirements for the sites of their individually licensed earth stations. For example, some may require ready access to an Internet data center while others do not. A single site selected by the Commission, by terrestrial operators, or by the first earth station licensee to deploy would not likely cover the full range of requirements for the various FSS operators or their customers. For example, one common requirement would be high-capacity fiber connections, ideally provided on redundant routes by multiple providers in order to reduce the risk of outages. This could present a challenge if all operators are required to deploy at a single site. For example, if each operator needed a primary and back-up fiber connection of 10 Gbps each, and there were 5 FSS operators that wanted to deploy in the same county, the bandwidth demand would be 100 Gbps. Arranging for that level of connectivity is challenging almost anywhere, but especially so for FSS earth stations deployed outside densely populated areas.

Site Size. Of equal importance, it will be extremely challenging for multiple FSS earth station licensees to operate from a single location.⁶ Many of these operators compete with one another, and forcing them to use the same facility could compromise competitively sensitive information about network technology or operating procedures. If the Commission were to restrict FSS earth stations to specific locations, it would have to define those locations in a way that provides a sufficiently large geographic area for multiple operators to deploy safely and securely. Even then, there would be no guarantee that space at a given site would be available

⁴ See, e.g., Letter from Stacey Black, *et al.*, to Marlene H. Dortch, GN Docket No. 14-177 and IB Docket No. 15-256, at 1 (June 1, 2016) (“interference from *existing* transmit FSS earth stations into 5G networks can be addressed by requiring those satellite earth stations to reduce their power flux density (“PFD”) at 10 meters above ground level to -77.6 dBm/m²/MHz at 200 meters”) (emphasis supplied).

⁵ While the focus of this filing is co-located multiple entry, for some signatories it may be too restrictive even for single entry in the future.

⁶ See, e.g., Letter from Suzanne Malloy to Marlene H. Dortch, GN Docket No. 14-177, *et al.*, at 7-8 (May 31, 2016) (discussing practical challenges to earth station co-location).

for purchase or lease, or that every operator would be able to secure all necessary supporting infrastructure.

Accounting for Variations in Counties. The Broadband Satellite Companies understand that the proposal to limit 28 GHz earth stations to a single location in each county is designed to ensure that at least one area in each county is available for FSS deployment without unduly constraining deployment of UMFU systems. In connection with any effort to facilitate continued FSS earth station deployment, the Broadband Satellite Companies urge the Commission to take into account the fact that, in many cases, there will be more than one location per county where such deployment would not unduly constrain UMFU deployment. For example, there are many areas in which the population density is so low that deployment of UMFU networks would be unlikely at best. This is especially the case with respect to counties that do not contain and are sufficiently distanced from urban population centers, or that are the size of a small state or that cover thousands of square miles. The Commission should take these varying characteristics into account in any spectrum sharing regime adopted for the 28 GHz band.

Accordingly, the Broadband Satellite Companies urge the Commission not to restrict FSS earth station deployment to a limited number of pre-designated co-location sites. We understand that the Commission does not want to restrict future UMFU deployment unduly, and have engaged in efforts to develop the technical basis for sharing that gives UMFU operators freedom to deploy where their services are most likely to be used. Whatever else it may do, the Commission should give 28 GHz FSS operators: (1) the flexibility to choose where to locate their earth stations based on system design, technical characteristics, and the needs of their customers (including not only commercial, but also U.S. government, military, and first responders); (2) the right to deploy, modify, and add transmitters to those earth stations on a co-primary basis; and (3) the ability to deploy those facilities over a five year period after licensing.

Respectfully submitted,

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