

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 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 37.5-40.0 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 ECHOSTAR SATELLITE OPERATING CORPORATION,
HUGHES NETWORK SYSTEMS, LLC, AND ALTA WIRELESS, INC.**

Deborah Broderson
Director, Regulatory Affairs
ALTA WIRELESS, INC.
11717 Exploration Lane
Germantown, MD 20876

Jennifer A. Manner
Vice President, Regulatory Affairs
Alexander Gerdenitsch
Senior Principal Engineer,
Regulatory Affairs
ECHOStar SATELLITE OPERATING CORPORATION
HUGHES NETWORK SYSTEMS, LLC
11717 Exploration Lane
Germantown, MD 20876

SUMMARY

EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, and Alta Wireless, Inc. (collectively, “EchoStar”) have both satellite and terrestrial systems currently operating in or under development for spectrum bands above 24 GHz, which they use to provide broadband services not only for consumer use, but also to support important government, public safety, educational, and health-related activities. In this proceeding, the Commission seeks to promote a flexible regulatory environment for the next generation of terrestrial mobile wireless services in this high-band spectrum while also preserving opportunities for use of these bands by incumbent services. EchoStar supports the Commission’s effort to craft a regime that will facilitate spectrum sharing among a wide variety of users and platforms to make intensive use of these valuable national resources. If properly managed, these bands offer the potential bandwidth necessary to support the ever-increasing demands of today’s consumers and other users for broadband connectivity.

Because of the characteristics of the services involved, spectrum sharing can be accomplished without compromising the promise of either satellite or terrestrial systems if the appropriate rules are put in place that account for their differing characteristics. Satellite operators deploy relatively few gateway earth stations and typically locate them in less densely populated areas. Because these gateways transmit toward and receive from space, they are unlikely to affect or be affected by terrestrial base stations beyond a localized area (on the order of 0.2 to 2 km radius). Although the precise contours of next-generation terrestrial services remain under development, terrestrial operators are likely to concentrate their usage of this spectrum in densely populated areas, where small cell deployment is compatible with this spectrum’s attenuation limitations. Accordingly, satellite and terrestrial fixed/mobile services in

these bands with co-primary status (as they are in the U.S. Table of Frequency Allocations) likely can share spectrum in a way that allows each to flourish and maximizes utility for the public.¹

Unfortunately, the rules proposed in the *Notice* do not take full advantage of these service characteristics, and as a result fail to adequately protect the interests of satellite operators who have already invested heavily in developing these bands and are using them to provide services to millions of U.S. consumers, including the public safety community. Those proposals envision that new mobile rights in these bands would be awarded to existing terrestrial licensees in their current licensed areas, and auctioned in the remaining areas. Although the Commission also proposes several mechanisms through which existing and future satellite facilities could simulate a form of co-primary status, they would apply only in some instances and some areas and would be available only for a limited period of time. Thus, those proposals not only jeopardize satellite services currently enjoyed by U.S. consumers, but also fall well short of providing the reliable spectrum availability necessary to justify continued investment in and development of these bands by satellite operators.

Moreover, the use of an auction in connection with satellite operations unnecessarily implicates the ORBIT Act, which prohibits the Commission from using competitive bidding to license spectrum used for the provision of international or global satellite communications services. In attempting to avoid this prohibition, the Commission argues that it is only licensing terrestrial services – but the result is a murky regulatory scheme. It is not even clear whether a satellite earth station operator that holds one of these terrestrial licenses would have to comply with all of the rules applicable to terrestrial service (including build-out requirements, limitations

¹ Satellite user terminals, which would be deployed more ubiquitously, would be authorized on a secondary basis.

on power, and frequency channelization), even if it only wants to provide satellite service and its services are authorized solely under Part 25 of the Commission's rules.

Rather than contort its rules in order to maintain this legal fiction, the Commission would be far better served by acknowledging the obvious – that gateway earth station operators should not be forced to participate in an auction of terrestrial licenses in order to achieve a quasi-co-primary status with fixed and mobile systems in the band. The Commission should instead take the more straightforward approach of grandfathering gateway earth stations licensed prior to the auction of terrestrial licenses, and adopting co-primary sharing criteria (such as first in time, first in right) for satellite and terrestrial systems deployed thereafter. Such an approach would be more consistent with the ORBIT Act, and also more likely to result in the intensive use of spectrum the Commission hopes to promote, ensuring that all services allocated to these bands – and not just new terrestrial mobile services – will be able to thrive and provide U.S. consumers the broadband and other services they demand.

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	I
INTRODUCTION.....	4
A. ECHOSTAR IS A LEADING TECHNOLOGY COMPANY WITH SATELLITE ASSETS THAT PLAY AN INCREASINGLY IMPORTANT ROLE IN THE U.S. AND WORLD ECONOMY.....	4
B. SATELLITE OPERATORS WILL NEED RELIABLE ACCESS TO ADDITIONAL SPECTRUM IF THEY ARE TO DELIVER THE INNOVATIVE SERVICES OF THE FUTURE	6
DISCUSSION	9
A. IN THE ABSENCE OF DEFINITIVE INFORMATION ON THE CHARACTERISTICS AND OPERATING PARAMETERS OF 5G SERVICES, THE COMMISSION MUST TAKE A CONSERVATIVE APPROACH IN ORDER TO PROTECT SATELLITE USE OF THESE BANDS	11
B. THE COMMISSION SHOULD ADOPT A SPECTRUM SHARING REGIME UNDER WHICH BOTH 5G AND NON-5G SERVICES CAN THRIVE	12
i. The 28 GHz Band (27.5-28.35 GHz)	13
a. The Commission Should Award Mobile Operating Rights to Existing LMDS Licensees in Their Licensed Areas	14
b. The Commission Should Give 28 GHz FSS Gateway Earth Stations Co-Primary Status.....	15
1. <i>Grandfathering existing gateways</i>	18
2. <i>Sharing rules for new gateways</i>	21
c. The Auction-Based Process Proposed in the <i>Notice</i> Will Not Adequately Protect the Reasonable Expectations of FSS Gateway Operators In This Band.....	22
ii. The 39 GHz Band (38.6-40.0 GHz)	24
a. The Commission Should Eliminate the Dual Licensing Regime for 39 GHz FSS Gateways.....	27
b. The Commission Should Allow FSS User Equipment to Operate on a Secondary Basis	30
iii. The 37 GHz Band (37.0-38.6 GHz)	30
C. LICENSING ISSUES.....	32
i. Tying Satellite Operations to Terrestrial Area Licenses Assigned by Auction Is Both Bad Spectrum Policy and Legally Suspect	32
ii. Performance Requirements	38
a. Subdividing LMDS Licenses on a County Basis Should Not Prejudice Operators' Reasonable Expectations	38

b.	FSS Earth Stations Do Not Need New Performance Requirements	39
iii.	The Use of Combinatorial Bidding for UMFU Licenses Would Unduly Prejudice FSS Interests.....	40
D.	TECHNICAL ISSUES	41
i.	System Security	41
ii.	Operating Parameters for UMFU Licensees	42
	CONCLUSION	43

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 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 37.5-40.0 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 ECHOSTAR SATELLITE OPERATING CORPORATION, HUGHES NETWORK SYSTEMS, LLC, AND ALTA WIRELESS, INC.

EchoStar Satellite Operating Corporation (“ESOC”), Hughes Network Systems, LLC (“Hughes”), and Alta Wireless, Inc. (“Alta” and collectively, “EchoStar”) submit these

comments in response to the Commission’s Notice of Proposed Rulemaking (the “*Notice*”),² which proposes rules for mobile use of the millimeter wave (“mmW”) bands above 24 GHz in an effort to develop a regulatory framework that will help facilitate so-called Fifth Generation (“5G”) mobile services. The Commission’s proposals are intended to “promote a flexible regulatory environment for the next generation of wireless services” and also to “facilitate sharing among a wide variety of users and platforms.”³

EchoStar welcomes the Commission’s effort to make more efficient use of the targeted spectrum and to promote the development of 5G services. As a current terrestrial and satellite licensee in some of these bands, EchoStar is particularly encouraged by the Commission’s recognition that “[c]urrent licensees that choose to continue their existing, authorized services should be able to do so.”⁴ EchoStar also appreciates the Commission’s intent “not to favor mobile service over fixed or satellite service”⁵ and to “examine possible means of allowing enhanced satellite use of shared bands.”⁶ The Commission must ensure that spectrum efficiency results in both existing and new users flourishing and not simply new spectrum licensees benefiting at the expense of existing licensees. Proposals of the latter type would be unfair to existing licensees, would not result in efficient spectrum usage, and also could result in

² See *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Notice of Proposed Rulemaking, 30 FCC Rcd. 11878 (2015) (“*Notice*”).

³ *Id.* ¶¶ 1, 2.

⁴ *Id.* ¶ 22.

⁵ *Id.* ¶ 44.

⁶ *Id.* ¶ 22.

unintended consequences inconsistent with the public interest, such as loss of access to critical public safety and homeland security services provided by existing licensees.

However, because of the current state of 5G technology,⁷ EchoStar is concerned that it will be difficult to perform the necessary analyses and craft appropriate rules at this time. Sharing among radio services is largely dependent on the technical characteristics of each service. Unfortunately, the characteristics of 5G are not yet well defined. In the absence of such crucial information, the Commission should make conservative assumptions to ensure that spectrum sharing works in a manner that gives existing services in the band the flexibility they need to grow as consumer demand warrants.

Even without complete information, it appears that some of the proposals in the *Notice* do not adequately protect the interests of satellite operators and the significant U.S. customer base for their services.⁸ In these comments, we suggest alternative approaches that would better achieve that goal while still enabling more intensive and flexible use of spectrum by terrestrial mobile systems. We focus particularly on the 28 GHz band (27.5-28.35 GHz), the 39 GHz band (38.6-40.0 GHz), and the 37 GHz band (37.0-38.6 GHz), which are either currently used by satellite operators or are being actively targeted for expansion of Fixed-Satellite Service (“FSS”), and in the *Notice* are now proposed to be subject to the new Upper Microwave Flexible Use (“UMFU”) service licensing regime.

⁷ Standardization efforts for 5G technology are in their early stages, and are not expected to be completed until 2020. *See* footnote 31, *infra*.

⁸ In the United States today, approximately 2 million consumers utilize satellite broadband services provided in the 28 GHz band. That number, while already growing, is expected to increase significantly with the launch later this year of next-generation 28 GHz band broadband satellites by both Hughes and ViaSat Inc.

INTRODUCTION

A. ECHOSTAR IS A LEADING TECHNOLOGY COMPANY WITH SATELLITE ASSETS THAT PLAY AN INCREASINGLY IMPORTANT ROLE IN THE U.S. AND WORLD ECONOMY

Founded by Charlie Ergen in 1980, today EchoStar, a U.S. company, is a leader in the technology sector. It is 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-four owned, leased or managed satellites in the FSS, Broadcasting-Satellite Service (“BSS”) and Mobile-Satellite Service (“MSS”), with three satellites scheduled for launch this year, including EchoStar XIX, which will provide significant advanced broadband capacity in the 28 GHz band to U.S. consumers.⁹

Alta operates terrestrial Local Multipoint Distribution Service (“LMDS”) networks. It provides an array of point-to-point and point-to-multi-point services in four markets.¹⁰ Alta leases portions of its spectrum to Nextlink Wireless, LLC, a subsidiary of XO Communications that provides backhaul and others services, and uses the remaining network capacity for internal purposes.

Hughes is the largest satellite broadband provider in North America, serving over one million users through two satellites, Spaceway 3 and EchoStar XVII, operating in the Ka-band (including the 28 GHz band). Further, as recently announced, Hughes will be launching a broadband satellite service in Brazil later this year,¹¹ and has additionally procured capacity on

⁹ Other EchoStar subsidiaries develop technology and equipment for a variety of communications services. For example, EchoStar’s subsidiary Sling Media Inc. designs and manufactures innovative set-top boxes, including the Joey and Hopper. *See, e.g.*, Sling Media Inc., <http://www.slingbox.com/>.

¹⁰ Alta holds four LMDS licenses covering the San Diego, Phoenix, Kansas City, and Cheyenne Basic Trading Areas or BTAs. *See* Call Signs WPOH667, WPOH669, WPOH670, and WPOH668.

¹¹ *See* Business Wire, “Eutelsat Concludes Deal with EchoStar’s Hughes for High-Throughput Capacity on the EUTELSAT 65 West A Satellite for Broadband to Brazil” (Apr. 23, 2014), *available at*

Telesat’s new Telstar 19 Vantage satellite, scheduled for launch in early 2018, to expand broadband satellite service in Latin America.¹²

Hughes broadband service supports consumer use, as well as important government, public safety, educational, and health-related activities. For example, Hughes has helped rural schools across the country to bridge the digital divide left by terrestrial networks by providing high-speed broadband capacity that enables students to access the Internet.¹³ Hughes also provides vital Internet and voice services to communities during natural disasters and emergencies, when terrestrial and wireless networks have failed or are unreliable.¹⁴ For example, in the aftermath of Hurricane Sandy, broadband services via satellite were the only telecommunications service available in parts of the New York City area.¹⁵

<http://www.benzinga.com/pressreleases/14/04/b4489809/eutelsat-concludes-deal-with-echostars-hughes-for-high-throughput-capac>.

¹² See, e.g., Press Release, “Hughes and Telesat Sign Agreement for High-Throughput Capacity on Telesat’s New Telstar 19 VANTAGE Satellite Covering South America” (Nov. 11, 2015), available at <http://echostar.com/NewsEvents/PressReleases/PressRelease.aspx?prid=31408>.

¹³ See, e.g., Hughes Network Systems, LLC, *Eliminating the DIGITAL DIVIDE in our Schools* (Summer 2015), available at <http://www.hughes.com/company/newsletters/summer-2015/eliminating-the-digital-divide-in-our-schools>.

¹⁴ See Press Release, “Hughes Announces Emergency Networking Solutions for Hurricane Season,” (Jun. 9, 2015), available at <http://www.hughes.com/company/news/hughes-announces-emergency-network-solutions-for-hurricane-season>.

¹⁵ See Press Release, “Hughes Announces New Emergency Networking Solutions for Hurricane Season” (Jun. 3, 2013), available at <http://www.hughes.com/resources/hughes-announces-new-emergency-networking-solutions-forhurricane-season> (“We learned firsthand the value of satellite broadband service in the days, weeks, and months following Hurricane Sandy.... The storm destroyed over 120 homes in New York’s Breezy Point area and knocked out landlines. Cell phone coverage was completely unreliable. Hughes satellite technology was the only thing that worked, and we used it—and continue to use it—to coordinate rebuilding efforts.”). Similarly, during the aftermath of the earthquake in Haiti in 2010, Hughes satellite broadband was instrumental in assisting the State University Hospital of Haiti in providing medical assistance through telemedicine. See Hughes Network Systems, LLC, *Haitian Earthquake Relief Efforts*, available at <http://government.hughes.com/resources/haitian-earthquake-relief-efforts>.

B. SATELLITE OPERATORS NEED RELIABLE ACCESS TO ADDITIONAL SPECTRUM IF THEY ARE TO DELIVER THE INNOVATIVE SERVICES OF THE FUTURE

As a pioneer of satellite broadband services, EchoStar knows firsthand the ever-increasing importance of FSS services. Satellite broadband services have consistently increased both the availability and the quality of service for U.S. consumers over the last decade. This is especially important in the most rural and other areas underserved by terrestrial alternatives, where satellite broadband has helped expand opportunities available through broadband connectivity for those who might otherwise have been left behind.¹⁶ Satellite systems also provide service to a variety of platforms, from airlines to ships to moving vehicles. In addition, FSS systems support other broadband operators, including terrestrial mobile systems, by providing backhaul and other services. Thus, FSS enables the efficient extension of broadband services even to those who never communicate directly with a satellite. Most importantly, satellite broadband is relied upon by public safety officials during times of emergency when terrestrial infrastructure is not available.

As a result, the demand for satellite broadband services has grown tremendously.¹⁷ A recently released report forecasts that this trend will accelerate, with data volume for satellite fixed broadband expected to grow at a compound annual growth rate of 27% over the next ten years. “This unprecedented push in data volume via satellite (and thus capacity demand) is

¹⁶ See, e.g., Tony Bardo, “How satellite technology can help close the digital divide,” ESCHOOL NEWS (Sep. 2, 2015) (discussing availability of high-quality satellite broadband to underserved and rural schools), available at <http://www.eschoolnews.com/2015/09/02/satellite-technology-628/>.

¹⁷ See Satellite Industry Association, *2015 State of the Satellite Industry Report*, at 11 (Sep. 2015) (revenues increased from \$1.0 billion in 2009 to \$1.8 billion in 2014), available at <http://www.sia.org/wp-content/uploads/2015/06/Mktg15-SSIR-2015-FINAL-Compressed.pdf>.

driven by both the addition of new Consumer Broadband subscribers and the higher consumption of bandwidth per site.”¹⁸

Clearly, satellite operators need reliable access to additional spectrum in order to have sufficient capacity to meet growing consumer demands for these services. This demand, in turn, has led satellite operators to explore and invest in the development of expansion bands, including some of those at issue in this proceeding.¹⁹ Thus, while the spectrum above 24 GHz may be newly of interest to terrestrial mobile operators, it has been under active use and development by FSS operators for many years.

Because satellite technology has a long development path, regulatory certainty is critical to investment in satellite broadband. The technology is extraordinarily complex, and satellites require considerable time and upfront costs to plan, build and launch. The planning, construction, and launch process alone can require more than five years, and a satellite asset is typically designed to last 15 years or more. One key to such long-range planning is reliable access to appropriate spectrum. For example, as the Commission has recognized with respect to terrestrial wireless broadband providers, satellite broadband systems will need broad swaths of contiguous spectrum provide the capacity necessary to deliver next-generation services.²⁰

Not surprisingly, the U.S. government, including the Commission, has consistently recognized the need for long-term certainty in the satellite industry to provide the services

¹⁸ “NSR . . . Fasten Your Seat Belts for a Satellite Traffic Data Explosion,” SATNEWS DAILY (Dec. 9, 2015), available at <http://www.satnews.com/story.php?number=1771428647>.

¹⁹ As just one example, the Commission issued 17 earth station authorizations to Hughes in September and October 2015 for operations in the 28 GHz band to support the introduction of services from Jupiter II. See Call Signs E150076 through E150092.

²⁰ See Notice, ¶ 20.

demanded by U.S. consumers.²¹ Failure to establish adequate protection for existing operators could jeopardize billions of dollars in investments and, perhaps more importantly, harm U.S. consumers and government agencies by diminishing the regulatory certainty upon which existing service providers currently rely. Any action the Commission takes in this proceeding should not only protect existing facilities from harmful interference but also afford satellite operators a clear path toward expansion to meet future consumer demands.

This approach is consistent with the international consensus recently developed at the 2015 World Radio Conference. At that conference, many administrations expressed interest in the development of next-generation mobile networks, dubbed International Mobile Telecommunications (“IMT”). In preparation for the next conference in 2019, the international community identified candidate bands above 24 GHz to be studied for development of IMT services.²² In arriving at that decision, the conference considered “the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service.” It also recognized that “any identification of frequency bands for IMT should take into account the use of the bands by other services and the evolving needs of these services,” and that “there should be no additional regulatory or technical

²¹ See, e.g., *In the Matter of 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*, 18 FCC Rcd. 25428, ¶ 54 (2003) (“We recognize that both Government and commercial systems must remain sufficiently sure of their access to orbital and spectrum resources if they are to proceed with research, development and production of their planned space-station systems.”); Executive Office of the President, *National Space Policy of the United States of America*, at 9 (2010) (requiring the U.S. government to (1) “[s]eek to protect U.S. global access to, and operation in, the radiofrequency spectrum and related orbital assignments required to support the use of space by . . . U.S. commercial users;” and (2) “[s]eek to ensure the necessary national and international regulatory frameworks will remain in place over the lifetime of the system”), available at http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

²² See Provisional Final Acts, World Radio Conference 2015, Resolution COM 6/20 (WRC-15), available at https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-WRC.11-2015-PDF-E.pdf.

constraints imposed to services to which the band is currently allocated on a primary basis.”²³

The Commission should also bear these considerations in mind as it evaluates proposals in this proceeding.

As discussed below, many EchoStar services currently operate in or are being designed to use the frequency bands above 24 GHz and will be affected directly by any Commission decision to enable sharing with new 5G services. Because it has interests in both satellite and terrestrial authorizations in the bands under consideration in this proceeding, EchoStar is uniquely positioned to assess the balance struck by the Commission’s proposals for sharing amongst various services and technologies.

DISCUSSION

In identifying spectrum bands for consideration in this proceeding, the Commission was guided by four main criteria:

1. “[F]ocus on bands with at least 500 MHz of contiguous spectrum.”²⁴
2. The target bands should be those “that are being considered internationally for mmW mobile service,” given that “substantial international harmonization would help promote development of mmW mobile service by reducing development and equipment costs and promoting a unified world market.”²⁵
3. “[M]obile use in mmW bands should be compatible with existing incumbent license assignments and uses. Current licensees that choose to continue their existing, authorized services should be able to do so.”²⁶

²³ *Id.*

²⁴ *Notice*, ¶ 20.

²⁵ *Id.* ¶ 21.

²⁶ *Id.* ¶ 22.

4. “[I]t is important to establish a flexible regulatory framework that accommodates as wide a variety of services as possible.”²⁷

While all of these criteria are appropriate for consideration, the Commission’s proposals do not always reflect them. For example, not all of the bands targeted in this proceeding have been identified internationally for further study and development for use by IMT systems.²⁸ Similarly, some of the Commission’s proposals would not be compatible with existing FSS license assignments and uses, and as currently proposed, would not accommodate growth and enhancement of such services in the future.

EchoStar urges the Commission to proceed cautiously, given that the development of 5G technology has not reached a point where sharing strategies can be fully evaluated. Although the lack of that information hampers a comprehensive analysis of the Commission’s proposals, EchoStar offers below its preliminary views on some of those proposals, focusing particularly on the 28 GHz, 39 GHz, and 37 GHz bands. These bands are either currently used by satellite operators or are being actively targeted for expansion of FSS services, and under the approach proposed in this proceeding would be subject to the new UMFU service rules and licensing regime.

²⁷ *Id.* ¶ 23.

²⁸ In advance of the recent World Radio Conference held in November 2015, the United States supported the Inter-American Telecommunications Commission (“CITEL”) proposal that the band from 27.5-29.5 GHz (among others), which includes the 28 GHz band, be considered for the terrestrial component of IMT to facilitate mobile broadband applications, with the aim of reaching decisions regarding possible spectrum for mobile use at WRC-19. *See Notice*, ¶ 13 and n.29. Due to lack of support from the international community, that part of the proposal failed, however, and the 28 GHz band was not identified as a candidate to be studied for development of IMT services before the next conference in 2019. *See Provisional Final Acts, World Radio Conference 2015, Resolution COM 6/20 (WRC-15)*. Accordingly, this band no longer satisfies one of the central criteria the Commission identified for targeting spectrum for 5G mobile services in this proceeding. Conversely, the failure to allow satellite systems to provide regional or global services in this band would lead to obvious inefficiencies in spectrum use and could be financially devastating to operators.

A. IN THE ABSENCE OF DEFINITIVE INFORMATION ON THE CHARACTERISTICS AND OPERATING PARAMETERS OF 5G SERVICES, THE COMMISSION MUST TAKE A CONSERVATIVE APPROACH IN ORDER TO PROTECT SATELLITE USE OF THESE BANDS

In the *Notice*, the Commission seeks comment on a range of issues related to the co-existence between satellite and terrestrial mobile services in the target bands. Use of the mmW bands by 5G systems will likely be concentrated in high-density urban areas, where small cell deployment is compatible with this spectrum’s attenuation limitations.²⁹ As envisioned by its proponents, 5G technology could significantly expand the capabilities and diversity of mobile services.

In addition to supporting the evolution of the established prominent mobile broadband use cases, 5G will support countless emerging use cases with a high variety of applications and variability of their performance attributes: From delay-sensitive video applications to ultra-low latency, from high speed entertainment applications in a vehicle to mobility on demand for connected objects, and from best effort applications to reliable and ultra-reliable ones such as health and safety. Furthermore, use cases will be delivered across a wide range of devices (*e.g.*, smartphone, wearable, MTC) and across a fully heterogeneous environment.³⁰

Unfortunately, however, while there are any number of possibilities and theoretical applications, there is no clear definition of the technical characteristics of 5G systems. The process of setting technical standards for 5G is in its initial stages.³¹ Without a fully developed concept including

²⁹ See, *e.g.*, *Notice*, ¶¶ 45, 202, 212. See also Next Generation Mobil Networks Alliance, “NGMN 5G White Paper,” at 41 (Feb. 17, 2015), available at http://www.ngmn.org/fileadmin/ngmn/content/downloads/Technical/2015/NGMN_5G_White_Paper_V1_0.pdf (“NGMN 5G White Paper”) (“network site densification will be an important approach to deliver substantial data rate and capacity gains, particularly as it also supports the use of higher frequency spectrum”); Small Cell Forum, “Small Cells and 5G Evolution: A Topic Brief,” at I (June 9, 2015), available at <http://www.scribd.com/doc/291453941/Small-Cells-and-5G-Evolution#scribd> (“One of the areas of agreement about 5G is that it will involve ever-smaller cells, whether to support dense zones of high capacity, or ever-increasing data consumption indoors”).

³⁰ See NGMN 5G White Paper at 13.

³¹ See, *e.g.*, International Telecommunications Union, “Workplan, timeline, process and deliverables for the future development of IMT” (timeline for IMT-2020 contemplates submission of candidate technologies beginning in 2016, with evaluation and consensus building beginning in 2018 and continuing through a recommendation in

system characteristics and deployment scenarios, it is difficult for other users of the bands to evaluate the full panoply of strategies for sharing and coordination and identify the best one(s). With respect to federal satellite systems, the Commission has requested information on the technical characteristics for the mobile applications envisioned for these bands in order to enable federal agencies to conduct the necessary compatibility analysis.³² Commercial satellite system operators are entitled to no less.

In the absence of such information, the Commission must make conservative assumptions about the characteristics of 5G systems in order to ensure that FSS operators continue to have reliable access to these bands. In addition, to the extent that the lack of certainty about 5G technology causes uncertainty among UMFU licensees, the Commission cannot assume that they will be likely to agree to voluntary sharing arrangements with FSS operators until they have a better idea of what 5G services will look like and require. The Commission must proceed carefully or else risk choking off vibrant FSS services that are well established and growing rapidly.

B. THE COMMISSION SHOULD ADOPT A SPECTRUM SHARING REGIME UNDER WHICH BOTH 5G AND NON-5G SERVICES CAN THRIVE

EchoStar and the entire satellite industry – including operators, satellite manufacturers, and equipment manufacturers – have invested significant resources to develop spectrum above 24 GHz to provide the capacity needed to support next-generation services. However, because of the very different use cases and deployment characteristics of gateway earth stations and

2020), available at <http://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Documents/Antipated-Time-Schedule.pdf>.

³² Notice, ¶ 46.

terrestrial mobile stations, there is a very good chance that the two services can share these bands and both make productive use of valuable spectrum if the Commission gets the rules right. Unfortunately, the regime proposed in the *Notice*, while well intentioned, does not provide a suitable interference environment in which all services can thrive. As a result, certain U.S. consumers – especially those who live and work in rural and remote areas of the country where terrestrial broadband services are limited or unavailable – would be negatively affected. Below, we discuss proposals that are better alternatives to achieve the Commission’s goals in this proceeding.

i. The 28 GHz Band (27.5-28.35 GHz)

The United States has allocated the 28 GHz band on a co-primary basis to Fixed, Mobile, and FSS (Earth-to-space) services.³³ However, under a band segmentation plan adopted in 1996, the Commission has designated this band for use by fixed LMDS systems on a “primary protected basis.”³⁴ The Commission auctioned the terrestrially-based LMDS spectrum in 1998, and today there are a number of LMDS systems deployed in the United States. By rule, FSS is secondary to LMDS in this band, and limited to deployment of gateway earth stations.³⁵

A number of satellite companies, including Hughes, are either licensed or have proposed to operate their FSS gateways in the 28 GHz band. At present, forty-three gateway earth stations

³³ See U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106.

³⁴ See 47 C.F.R. § 101.1005(b)(1). See also *id.* at § 101.3 (defining an LMDS system as “[a] fixed point-to-point or point-to-multipoint radio system” consisting of hub stations and subscriber stations).

³⁵ 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”).

are licensed in the band, with one additional application pending.³⁶ These gateways are critical to support the provision of satellite broadband services. However, by their nature, they are not deployed in large numbers (much less ubiquitously), typically are located outside of densely populated areas, and operate with natural and/or man-made shielding and other obstacles that limit signal propagation toward terrestrial systems. Because these characteristics of FSS gateways differ so markedly from those anticipated for 5G systems, the Commission has an opportunity to devise rules for spectrum sharing that can enable both services to thrive and make intensive use of valuable resources. We discuss the options for such sharing below.

a. The Commission Should Award Mobile Operating Rights to Existing LMDS Licensees in Their Licensed Areas

EchoStar supports the Commission's proposal to award mobile operating rights to existing LMDS licensees for geographic areas in which they currently hold licenses covering the 28 GHz band.³⁷ By definition, those LMDS operators that still hold licenses have shown their readiness to use this spectrum, as they have satisfied the Commission's build-out requirements in order to renew their licenses.³⁸ As the Commission notes, awarding mobile rights to existing licensees will minimize transaction costs and provide the fastest transition to expanded use of the band, which would be to the benefit of consumers. By enabling existing licensees to offer a wider variety of terrestrial services, the Commission would increase the efficient use of the 28 GHz band and facilitate the introduction of more dynamic and diverse service offerings to

³⁶ See generally International Bureau Filing System (last visited January 22, 2016). Hughes currently holds 17 gateway earth stations authorized to communicate in the 28 GHz band.

³⁷ Notice, ¶ 95.

³⁸ See 47 C.F.R. § 101.1011.

current and prospective customers or LMDS operators. This approach would also be consistent with Commission precedent when it previously added mobile rights to a band that had been licensed only for fixed services.³⁹

By contrast, splitting mobile and fixed rights would create complicated sharing and interference issues between the services. It could also force the Commission to draw fine distinctions between fixed and mobile services that are increasingly converging, in order to determine a licensee's compliance with build-out requirements. Moreover, an overlay auction would be impractical in this situation. In past overlay auctions, the incumbent licensees were authorized to operate only in a localized area that could be clearly defined so as to allow an auction winner to operate freely outside the protected zone. LMDS licensees are already entitled to operate throughout a large geographic area and cannot similarly be restricted to a specific service area within that territory. The far better approach is, as the Commission has proposed, to grant LMDS licensees the mobile rights in their licensed areas – subject, of course, to interference standards and technical rules to protect other existing users of the band from such expanded use.

b. The Commission Should Give 28 GHz FSS Gateway Earth Stations Co-Primary Status

At the outset, it is worth noting that FSS gateway earth stations use high-gain antennas that direct emissions towards their target satellites, which significantly limits any potential interference toward terrestrial 5G deployments. As a result, the area in which 5G systems might

³⁹ See, e.g., *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, 19 FCC Rcd. 14165, ¶¶ 111-112 (2004) (granting existing MDS and ITFS licensees mobile rights in their licensed areas).

experience interference is likely to be limited to a small area around each earth station facility. While it is impossible to determine the precise size and shape of this area without knowing more about the nature of 5G technology generally, an appropriate propagation model, and the specifics of the deployment involved, it is possible to approximate the area using reasonable assumptions. For example, using the 5G parameters submitted in this proceeding by Samsung⁴⁰ and a conservative path loss model (assuming free space loss plus 20 dB additional discrimination), the required coordination distance between a transmitting gateway and a mobile base station in this band would be approximately 170 meters.⁴¹ If we were instead to use the path loss model assumed by Samsung in its prior submission,⁴² the required coordination distance would be even smaller – approximately 60 meters.

These calculations do not include additional mitigation techniques that could be taken to optimize the interference environment for sharing. For example, the Commission seeks comment on a number of strategies that involve imposing different but corresponding limits on FSS earth stations and UMFU licensees. Specifically, it asks whether to:

1. Modify existing limits on FSS earth station transmissions in the 28 GHz band toward the horizon below a specified elevation angle;
2. Require 28 GHz UMFU licensees to be capable of screening out incoming signals above the same elevation angle or another complementary angle; and

⁴⁰ Letter from Robert Kubik to Marlene H. Dortch, GN Docket No. 14-177, Appendix (Aug. 28, 2015) (“Samsung Aug. 28 Ex Parte”).

⁴¹ For this calculation, we use a path loss model of: $PL = 20 \cdot \log_{10}(d) + 20 \cdot \log_{10}(f) + 92.45 + 20$, with d in km and f in GHz. Consistent with the parameters of EchoStar’s most recent earth station authorizations in this band, we assume a maximum EIRP of the FSS earth station towards the horizon of -19 dBW/MHz. We also assume a receive antenna gain of 11 dB for the 5G base station antenna towards the FSS earth station. All other relevant 5G receiver parameters are taken from the Appendix of the Samsung Aug. 28 Ex Parte.

⁴² See Samsung Aug. 28 Ex Parte, Appendix at Note 2 (path loss model Case (A): $PL = 36.7 \cdot \log_{10}(d) + 60.3$ (NLOS)).

3. Limit skyward emissions from terrestrial UMFU facilities in the 28 GHz band, and, if so, at what thresholds.⁴³

Unlike the auction-based approach, which would impose terrestrial-style regulation on a satellite service, this approach recognizes the differing operating characteristics of satellite and terrestrial services and proposes limitations appropriate to each. This is a promising approach to sharing by co-primary services in the band and could further decrease the areas in which one service could interfere with the other. We further note that the Commission may also require operators to coordinate in good faith to prevent harmful interference.

Thus, under any scenario the operation of FSS gateways in the 28 GHz band is unlikely to affect the deployment of 5G systems outside of an extremely small portion of the country. In addition, those areas are likely to be fairly rural or suburban, and not the dense urban areas envisioned as the most likely sites for 5G deployment. As a result, mobile UMFU systems should have little problem sharing the band with FSS gateways on a co-primary basis that gives both satellite and terrestrial operators reliable access to spectrum necessary to foster investment and expansion. This is consistent with the conclusion the Commission previously reached with respect to the V band (37.5-40.0 GHz), where it found that “[p]ermitting satellite ‘gateways’ to be deployed at large installations or large corporate campuses without generating the types of ubiquitous, consumer-level deployments, would not defeat the designation of wireless services as the predominant use in this band.”⁴⁴ The Commission, for similar reasons, should reach that same conclusion in this proceeding, and adopt rules accordingly.

⁴³ *Notice*, ¶¶ 156, 299.

⁴⁴ *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*, 18 FCC Rcd. 25428, ¶ 30 (2003).

1. Grandfathering existing gateways

As discussed above, one of the Commission’s four guiding criteria for targeted bands is that “mobile use in mmW bands should be compatible with existing incumbent license assignments and uses. Current licensees that choose to continue their existing, authorized services should be able to do so.”⁴⁵ At present, although FSS gateway earth stations have operated on a secondary basis in this band, the limited number of gateway facilities and the fixed nature of LMDS service has combined to facilitate spectrum sharing. Whether by choosing locations outside of licensed LMDS territories or operational areas, or through negotiated agreements with the LMDS licensees, FSS gateway operators have been able to establish a stable sharing environment that has worked for both fixed and satellite systems for years.

The introduction of mobile services could upset this balance unless clear sharing rules are adopted. As the Commission observed, “LMDS licensees purchased their licenses at auction with the understanding that their fixed and point-to-multipoint operations would have priority over FSS operations.”⁴⁶ From this, the Commission proposed “not to upgrade FSS operations at the expense of LMDS licensees.”⁴⁷ Yet at the same time, the Commission proposes to upgrade LMDS licensees from a strictly fixed authorization to one that allows them to provide both fixed and mobile services. This change could have a significant effect on current FSS licensees in the band. Those licensees have implemented their operations so as to avoid interference to a terrestrial service that communicates between known, fixed points. Satellite operators, including

⁴⁵ *Notice*, ¶ 22.

⁴⁶ *Id.* ¶ 137.

⁴⁷ *Id.*

EchoStar, have every reason to expect that this stable environment will continue to persist, as the 28 GHz frequencies “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.”⁴⁸ Authorizing the addition of mobile services threatens to expand the territory used for terrestrial operations, which also expands the areas in which an FSS earth station could cause interference.

In these circumstances, it is not fair to say that upgrading FSS to co-primary would be done “at the expense of LMDS licensees.” Rather, given that the likely interference scenarios arise from granting mobile rights to LMDS operators, it is the change to LMDS authorizations that is being made “at the expense of” the settled expectations of FSS operators. The best way to protect those expectations would be to “grandfather” FSS gateways that are licensed prior to a UMFU auction and elevate them to co-primary status with fixed and mobile operations in the band – a status consistent with the existing U.S. Table of Allocations. With the adoption of appropriate sharing rules, the Commission could enable both services to expand and innovate to meet customer needs using this band.

Outside of LMDS territories, the Commission is also worried that automatically granting FSS earth stations co-primary status could hamper the development of terrestrial mobile services.⁴⁹ Yet here again, history and the nature of gateway operations demonstrate that this concern is misplaced. Across the entire United States, FSS operators have only deployed 43

⁴⁸ *Id.* ¶ 5.

⁴⁹ Specifically, the Commission worried that, in the period before UMFU rules are finalized and licenses auctioned, existing FSS operators could unilaterally place gateway earth stations anywhere there was no current licensee (or where they could successfully coordinate with other co-primary users) and thus potentially preclude the development of mobile services in those areas. *Notice*, ¶ 130.

gateway earth stations in this band and sought authority for only one more. In all, these facilities are located in only 36 of the nation's 3,143 counties. About half of those earth stations (or proposed earth stations) are located within the service area of an active LMDS licensee.⁵⁰ As discussed above, based on reasonable assumptions, these gateways are likely to affect 5G systems only within a radius of from 60 to 170 meters.⁵¹ They also tend to be located in less densely populated rural and suburban areas, not in the urban areas where UMFU mobile operations are contemplated.

Given these facts, it is hard to see how deployment of a limited number of gateways outside the primary areas of interest to 5G services would be expected to adversely affect future UMFU licensees. Rather, potential bidders in a UMFU auction would be able to identify the location of all FSS gateway earth stations already licensed or for which applications are then pending, determine the area of potential interference within the immediate vicinity of such grandfathered gateways,⁵² and assess the value of any UMFU license of interest on that basis. Because the interference environment would be known, UMFU bidders could make informed decisions. Moreover, because FSS gateways are likely to affect only a very small area within a

⁵⁰ Twenty-one gateway earth stations operating in the 28 GHz band are located in a county covered by an LMDS license.

⁵¹ By contrast, the Commission established a 35-mile radius exclusion zone for incumbent facilities in connection with the MDS/BRS auction. *See Amendment of Parts 21 and 74 of the Commission's Rules With Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service*, 10 FCC Rcd. 9589, ¶ 56 (1995) (“a principal objective in this proceeding is to allow incumbents to continue existing operations without objectionable interference from new MDS operations and to allow them sufficient flexibility to modify their facilities to respond to market forces”); *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, 23 FCC Rcd. 5992 (2008); 47 C.F.R. § 27.1206(a).

⁵² Presumably, by the time the Commission holds an auction for UMFU licenses, operational characteristics of 5G services (including an appropriate propagation model) will be available for such an analysis.

very limited number of largely rural and suburban locations, there is no reason to believe that continued and even expanded use of this band by FSS would materially impair mobile deployment.

2. *Sharing rules for new gateways*

As the demand for satellite broadband services continues to grow, FSS operators will need to deploy a limited number of new gateways to handle the load and must be given the flexibility to do so.⁵³ Clearly, the Commission would need to put in place appropriate sharing rules to optimize intensive use of the band by all co-primary services. Because of the relatively small number of gateway earth stations that are required to operate an FSS system, one simple approach to sharing would be a first-in-time, first-in-right regime, similar to those the Commission has adopted in numerous other contexts.⁵⁴ Thus, FSS operators would have to take into account the operations of UMFU licensees in choosing potential gateway sites. The Commission could even establish a required coordination distance (based on calculations such as those presented above) to ensure that FSS gateways were built sufficiently far from UMFU base stations to protect their operations, or prescribe limitations on earth station operations (*e.g.*, on power or altitude of transmissions toward the horizon) that would make sharing with terrestrial

⁵³ There are satellites currently under development that will increase this demand in the near future. *See, e.g.*, Peter B. de Selding, “ViaSat Willing to Bet Big on Super-high-throughput Satellites,” SPACE NEWS (Nov. 10, 2015), available at <http://spacenews.com/viasat-willing-to-bet-big-on-super-high-throughput-satellites/>.

⁵⁴ *See, e.g.*, 47 C.F.R. § 25.203(c) (describing coordination of earth stations operating in frequency bands shared with equal rights between terrestrial and space services); *Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band*, 26 FCC Rcd. 8927, ¶ 13 (2011) (“When satellite services share a frequency band on such an equal basis, new space station entrants are required to avoid causing harmful interference to incumbent operators and radio stations/facilities are protected based on the order in which the license applications are either received or authorized.”); *Amendment of Part 27 of the Commission’s Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, 25 FCC Rcd. 11710, ¶ 186 (2010) (“[A]s is typically the case when co-primary services coordinate, we find a first-in, first-protected coordination approach is appropriate to address future AMT deployments.”)

mobile systems easier. Similarly, once a gateway earth station is installed and in operation, new systems providing 5G services in the 28 GHz band would have to coordinate and protect them. Such sharing could be managed through the use of a database with the location and characteristics of 5G and gateway deployments.⁵⁵ This would lead to substantially increased use of the band on a shared basis, consistent with the Commission's vision for more efficient spectrum use.

Alternatively, the Commission could withhold from the UMFU auction the licenses in some less densely populated areas. Those areas could then be available for use by FSS gateways, with the resulting geographic separation of services facilitating sharing of the band. If the Commission were to pursue this approach, it would need to ensure that it set aside sufficient room in appropriate areas to accommodate the expansion of multiple FSS systems providing services across the entire country.

c. The Auction-Based Process Proposed in the *Notice* Will Not Adequately Protect the Reasonable Expectations of FSS Gateway Operators In This Band

The *Notice* proposes a process through which some FSS gateway earth stations could secure a form of co-primary status in a limited area. The proposal has two aspects. First, for those earth stations that are currently licensed and in operation outside an LMDS licensed area, the FSS operator would be able to file in a closed application period for the UMFU license covering the area in which its earth station is located.⁵⁶ Second, operators of new FSS gateway earth stations that are licensed and operating prior to the UMFU auction in areas outside an

⁵⁵ Compare *Notice*, ¶¶ 147-155 (discussing potential strategies in the context of 28 GHz user equipment).

⁵⁶ See *id.* ¶ 140.

LMDS licensed area may seek a waiver of their secondary status and request co-primary status if they can demonstrate that their presence would be unlikely to have a negative impact on future terrestrial service.⁵⁷ If the earth station applicant receives a waiver, and the earth station is operating and providing service at the time of the closed auction filing window, it would be eligible to apply for an UMFU license during the closed filing window described above. In both cases, holding the UMFU license would confer a quasi-co-primary status because the FSS earth station operator would be able to exclude use of the 28 GHz band by others in its licensed territory.

EchoStar appreciates the Commission's attempt to fashion a process that would give at least some FSS gateways some level of protection. Unfortunately, however, the proposal falls well short in several respects. First and foremost, it would do nothing for those gateways currently operating in or proposed for areas covered by an LMDS license. Those gateways would be secondary to both fixed and mobile use of the band. As described above, the stable sharing environment currently enjoyed with fixed LMDS operations could be destabilized by the introduction of potentially ubiquitous mobile operations in the band, threatening continuity of FSS service to U.S. consumers.

Second, the process would no longer be available once the UMFU auction has occurred. Thus, to the extent an FSS operator needs to locate a gateway in a new area post-auction, it would have no ability to secure co-primary status.

Third, there is no guarantee that FSS operators would be able to secure sufficient spectrum rights in appropriate locations through the secondary market, much less secure them in

⁵⁷ See *id.* ¶ 145.

an efficient manner. Indeed, to the extent terrestrial operators view satellite systems as a competitor, they would have the incentive to refuse to make spectrum available, or could charge a prohibitively high price for access to it. Moreover, with 5G technology in a state of flux, UMFU licensees may not be willing to negotiate until service parameters and requirements are fully defined, which could cause years of delay. A multi-billion-dollar industry based on assets that take years to develop and deploy cannot rely on an unpredictable secondary market.

Lastly, as discussed more fully below, an approach based on an auction not only would result in inefficient spectrum usage, but would also cause confusion and raise a significant question of whether an auction is statutorily prohibited in this context.

Rather than trying to cobble together a second-best approach that simulates co-primary authority for FSS gateways in some instances and some areas that is available for a limited period of time, the Commission would be better served by simply granting such gateways co-primary status and developing appropriate sharing rules.

ii. The 39 GHz Band (38.6-40.0 GHz)

The United States has allocated the 39 GHz band on a co-primary basis to Fixed, Mobile, and FSS (space-to-Earth) services.⁵⁸ However, over a decade ago, the Commission adopted a soft segmentation approach under which, among other things, FSS systems are subject to lower power flux density limits in the 37.5-40 GHz band that favor implementation of fixed terrestrial systems.⁵⁹ Under the Commission's rules, moreover, FSS operators are limited to gateway earth stations only, which may only be deployed if the FSS licensee obtains a 39 GHz license in the

⁵⁸ See U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106.

⁵⁹ See 47 C.F.R. 25.208(r); *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*, 18 FCC Rcd. 25428, ¶ 24 (2003).

area where the earth station will be located, or if it enters into an agreement with the corresponding 39 GHz licensee.⁶⁰ At present, only about 35 percent of the terrestrial fixed licenses available in this band are in effect.⁶¹

There are currently no non-Federal FSS authorizations issued by, or applications pending before, the Commission in this band. However, for over a decade (spurred by actions taken at WRC-2000), the V-band has generally been considered the natural expansion band for broadband satellite system gateways. Operators have been planning accordingly, with satellite manufacturers developing appropriate technology. As satellite broadband consumer demand increases, satellite operators continue to be interested in operating in this band, which offers a substantial block of downlink spectrum that can be used to meet the steadily increasing demands of bandwidth-intensive applications and services. Indeed, when the Commission held its auction of 39 GHz licenses over a decade ago, one satellite operator (TRW) acquired 100 licenses in 11 Economic Areas and sought to use those licenses as a basis for providing FSS service.⁶² The Commission denied that request based on both the operator's failure to identify all of the terrestrial operating rules that would need to be waived and the lack of rules for terrestrial-

⁶⁰ See 47 C.F.R. 25.202(a)(1) n.3. The Commission adopted competitive bidding as a licensing method for this band in 1999, well before enactment of the ORBIT Act. See *Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands*, 14 FCC Rcd. 12428 (1999).

⁶¹ See *Notice*, ¶ 35 (859 of possible 2464 possible licenses outstanding).

⁶² See *TRW Inc.*, 16 FCC Rcd. 5198 (WTB 2001) ("TRW"). See also *Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands*, 19 FCC Rcd. 8232, ¶ 75 (2004) (confirming that "the Wireless Bureau has addressed precisely how the Part 101 Rules would be applied to a satellite earth station licensee that obtains a Part 101 license").

satellite sharing.⁶³ Although the Commission has revisited the sharing rules on a number of occasions,⁶⁴ it still has not adopted any for this band.

Satellite operators have made and are coordinating numerous ITU filings, expending considerable efforts to implement their plans for this band. Because satellites must be designed to provide service for over a decade in the unforgiving environment of space, development of satellite technology requires extensive testing to ensure performance characteristics and reliability before the first commercial deployment takes place. Such efforts are already well underway. For example, Alphasat, a satellite built by the European Space Agency in partnership with Inmarsat and launched in July 2013, hosts a Q/V-band payload that is used to conduct communication and propagation experiments to assess the feasibility of these bands for future commercial applications.⁶⁵ Additional satellites and user equipment are being designed to harness the potential of V-band spectrum. As familiarity with this band grows, the equipment to enable the use of this spectrum becomes more readily available, and the Ka-band becomes more congested, satellite use of the V-band as a gateway link will proliferate.⁶⁶

⁶³ TRW, ¶¶ 8, 10.

⁶⁴ See, e.g., *Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.541.5 GHz and 48.2-50.2 GHz Frequency Bands*, Third Notice of Proposed Rulemaking, 25 FCC Rcd. 15563, ¶¶ 26-29 (2010).

⁶⁵ See European Space Agency, *Alphasat's Pioneering High-Frequency Hosted Payload Set for Experiments* (Jan. 21, 2014), available at http://www.esa.int/Our_Activities/Telecommunications_Integrated_Applications/Alphasat/Alphasat_s_pioneering_high-frequency_hosted_payload_set_for_experiments.

⁶⁶ See, e.g., PRWeb, "Millimeter Wave Technology Market to Register 42.70% CAGR to 2020" (June 11, 2015) (discussing analyst report that satellite and radar systems markets are expected to grow with the highest CAGR, driven by increased use of V and E bands), available at http://www.prweb.com/releases/millimeter_wave/technology_market_2020/prweb12780527.htm.

Terrestrial mobile systems are much further behind, having only recently become interested in the band. Given that these systems have not yet deployed, and that most of the terrestrial licenses in the band remain unclaimed, the Commission has an opportunity to craft sharing rules that would allow all co-primary services to make intensive use of the band. It should take advantage of that opportunity.

Many of the observations made above with respect to the 28 GHz band are equally applicable to the 39 GHz band, such as the need for co-primary status for gateway earth stations and the problems with auctioning terrestrial licenses that would be used to afford some level of protection to FSS operations. Below we elaborate upon two issues specific to this band.

a. The Commission Should Eliminate the Dual Licensing Regime for 39 GHz FSS Gateways

Currently, an FSS operator must either hold the terrestrial 39 GHz license for the area where it proposes to operate a gateway earth station or secure the licensee's agreement. The Commission asks whether this regime should be updated in any way.⁶⁷ This regime is outdated and, if mobile operations are to be authorized in the band, could effectively preclude satellite development.

Unlike the 28 GHz band, FSS use of the 39 GHz band does not involve transmissions by earth stations. Rather, earth stations merely receive signals downlinked from satellites – signals that are relatively weak compared to terrestrial signals, and which are also subject to PFD limits imposed by the Commission's rules that are specifically designed to protect high-density

⁶⁷ Notice, ¶ 161.

terrestrial deployment.⁶⁸ As a result, there is no concern that FSS operations in the band will cause harmful interference to fixed or mobile terrestrial systems.

Conversely, it is possible that high-power transmissions from fixed and mobile base stations could interfere with the reception of satellite signals in the band under certain circumstances. Determining the precise extent of interference is difficult, given the lack of definitive information on 5G characteristics and the lack of a proven path loss model. The worst-case scenario would assume that almost the entire power of a terrestrial base station is transmitted towards an FSS gateway. This would result in a potential protection area with a radius of approximately 20 km considering free space propagation and a protection criterion of 6% increase in noise floor (-173 dBm/Hz).⁶⁹ However, terrestrial signals are likely to encounter obstacles (buildings, trees, hills, etc.) that make a free space assumption invalid. Assuming an additional 20 dB of discrimination to account for terrain, the potentially affected area drops to less than 2 km in radius. We propose that UMFU licensees and FSS operators coordinate to minimize impact to either service by setting appropriate harmful interference thresholds that can be met. In either case, the coordination area around a 39 GHz FSS gateway earth station would be much smaller than the one the Commission saw fit to establish for incumbent 39 GHz terrestrial systems prior to auction, which could cover an entire Basic Trading Area (“BTA”) or more.⁷⁰

⁶⁸ See 47 C.F.R. § 25.208(r).

⁶⁹ For this analysis, it is assumed that the terrestrial base station is transmitting with 65 dBm EIRP in 100 MHz of spectrum, and there is only a 10 dB antenna discrimination towards the FSS gateway station. Further, the FSS gateway antenna gain towards the terrestrial base station was assumed to -10 dB, consistent with Section 25.209 of the Commission’s rules. The formula for the free space path loss model is: $PL = 20 \cdot \log(d) + 20 \cdot \log(f) + 92.45$, with d in km and f in GHz.

⁷⁰ See *Amendment of the Commission’s Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands*, 12 FCC Rcd. 18600, ¶¶ 79-80 (1997) (where an incumbent licensee’s rectangular service area covers an entire BTA, its

An interference scenario where almost the entire power of a terrestrial base station is transmitting towards a FSS gateway station as assumed in the first calculation above is very unlikely. Moreover, it can be avoided by serving the terrestrial mobile station from a base station that is not transmitting directly toward the FSS gateway – a process that could be efficiently implemented if both UMFU and FSS licensees made available information on their operations in this band through an easily accessible database. As in the 28 GHz band, given the combination of the relatively small coordination zone required to protect 39 GHz earth stations, the limited number of gateways likely to be deployed nationwide, and their likely location in less densely populated areas, there is little reason to believe that FSS operations will impose any material limitations upon the development of 5G systems in the band. Indeed, it would not be surprising to find earth station facilities using both 28 GHz and 39 GHz spectrum, further reducing the areas of potential concern. Moreover, for the reasons discussed above with respect to the 28 GHz band and below with respect to auctions, dual licensing results in a confusing regulatory environment and inefficient spectrum usage.

Accordingly, the Commission should discard the requirement that a satellite earth station operator hold a license for terrestrial services in order to enjoy a semblance of the co-primary status to which it is entitled under the U.S. Table of Allocations. Instead, the Commission should eliminate the dual licensing regime in favor of a spectrum sharing approach similar to that discussed for the 28 GHz band. Any gateway earth stations that are licensed at the time of a 39 GHz UMFU auction should be grandfathered and protected as a co-primary service. After a 39 GHz auction has been held, FSS operators that wish to deploy additional gateway earth stations

channels will not be made available for overlay auction; if it covers only partially, the remaining area is made available). *See also* 47 C.F.R. § 101.147(v)(2).

in a terrestrial licensee's area should be required to engage in the same sort of standard coordination process as discussed above for the 28 GHz UMFU licensed areas; thereafter, UMFU licensees must protect FSS operations. To the extent some areas fail to attract bidders for 39 GHz licenses, FSS operators should be free to deploy gateways. Such an approach will enable FSS operators to develop this band as soon as possible without fear that their investment will be stranded, but will also leave the vast majority of the country – including the dense urban areas of most interest to 5G systems – available for deployment of mobile services.

b. The Commission Should Allow FSS User Equipment to Operate on a Secondary Basis

As discussed above, FSS earth stations would receive signals in the 39 GHz band. Thus, and in combination with the applicable PFD limits, they are no threat to terrestrial systems in the band even if ubiquitously deployed. So long as they are willing to accept potential interference from terrestrial systems, they should be allowed to make whatever use they can of this valuable spectrum. With the development of increasingly sophisticated equipment able to make opportunistic use of spectrum, allowing this band to be used to serve consumers will expand options and increase capacity available for satellite broadband systems. Accordingly, the Commission should lift its prohibition on the deployment of ubiquitous terminals that provide service to individual consumers.⁷¹

iii. The 37 GHz Band (37.0-38.6 GHz)

The United States has allocated this entire band to Fixed and Mobile services, and to FSS (space-to-Earth) with respect to the 37.5-38.6 GHz segment, all on a co-primary basis. There are

⁷¹ See 47 C.F.R. § 25.202(a)(1) n.3.

no incumbent licensees in the band. The greenfield status of the band affords the Commission an opportunity to consider the full range of innovative sharing approaches available to co-primary services.

Whereas the rules proposed for the 28 GHz and 39 GHz bands were designed to support provider-based services and WiFi-like services, the Commission seeks in this band to “facilitate a third type of network deployment: privately deployed networks that can provide 5G communications for advanced enterprise and industrial applications not suited to unlicensed spectrum or public network services.”⁷² Specifically, it proposes a hybrid licensing scheme that would convey licensed “local area” operating rights to premises occupants by rule, and separately, geographic area licenses for wide area use by auction. The Commission seeks suggestions for strategies that would allow the two types of licensees to coexist.⁷³

As in the 28 GHz and 39 GHz bands, EchoStar supports operations in the 37 GHz band by gateway earth stations on a primary basis and user equipment on a secondary basis. However, it does not appear that the hybrid licensing approach proposed in the *Notice* would lead to the best use of that band. Questions about who should control local rights and how the spectrum could be used outside local areas are very complex, and made more difficult by lack of 5G characteristics. Instead, the most spectrally efficient way for FSS and terrestrial systems to share this band would be to give one type of licensee relative priority over the other. One approach, discussed in the *Notice*, would be to segment the band by frequency. For example, the 1600 MHz of spectrum in the 37 GHz band could be divided into three 533 MHz or four 400 MHz blocks. One or two of these blocks could then be assigned by rule for use by FSS operators and

⁷² *Notice*, ¶ 100.

⁷³ *Id.* at ¶¶ 104, 294.

the others could be licensed to UMFU operators on a geographical area basis through an auction. Such band segmentation would efficiently ensure that ubiquitously deployed mobile handsets could operate throughout the licensed territory without worrying about interfering with or receiving interference from FSS systems operating in localized areas using adjacent spectrum.

Another approach would be to segment the band by geography. Under this approach, different services would be given priority in different areas. Thus, for example, since 5G services are expected to be deployed in high-density urban settings, fixed and mobile services could be given priority in those areas. Conversely, FSS could be given priority in those areas of lower population density, which are particularly suitable for gateway deployment. Such an approach would match the operational and geographic characteristics to optimize the productive use of this band. EchoStar urges the Commission to explore these sorts of segmentation options for this band, rather than pursuing the hybrid approach described in the *Notice*.

C. LICENSING ISSUES

i. Tying Satellite Operations to Terrestrial Area Licenses Assigned by Auction Is Both Bad Spectrum Policy and Legally Suspect

EchoStar does not oppose the use of auctions to license terrestrial UMFU systems. The use of auctions in this context is well established. However, the use of auctions in connection with FSS services is highly problematic from both a spectrum management perspective and a legal perspective. Satellite services are licensed under Part 25 of the Commission's rules. There is no reason to complicate that regime with an auction-related component that achieves only indirectly, imperfectly, and possibly illegally what the Commission should do in a straightforward manner: protect the integrity of FSS services.

The proposed auction structure would result in inefficient spectrum use by FSS systems. The Commission proposes to auction 28 GHz and 39 GHz UMFU licenses on a county basis.⁷⁴ Yet as discussed above, the area around a 28 GHz gateway where mobile operations might be affected has a radius of no more than about 170 meters, while the coordination distance required for a 39 GHz gateway is likely no more than about two kilometers. This is only a small fraction of a county, yet under the Commission’s proposal, an FSS operator would have to bid on and secure the license for the entire county in order to protect its future operations in these bands.

In an effort to grant existing gateway earth stations a semblance of co-primary status, the Commission proposes to allow each gateway licensee to file in a closed application period for the UMFU license in the area where its earth station is located.⁷⁵ The Commission has asked what size license area should be used for this purpose. Its stated goals are to ensure protection of FSS earth stations while minimizing the impact on terrestrial service in adjacent areas.⁷⁶ Although it has proposed to issue UMFU licenses on a county basis, it apparently contemplates that the licenses it would make available to existing FSS gateway licensees would be issued on a census tract basis, a geographic unit much smaller than a county.⁷⁷

⁷⁴ We would note, however, that proposed Section 30.301 makes only the 39 GHz band subject to competitive bidding, and omits the 28 GHz band.

⁷⁵ *Notice*, ¶¶ 140, 145, 162.

⁷⁶ *Id.* ¶ 141.

⁷⁷ *See* Proposed Section 30.5(c). According to the Census Bureau, “[c]ensus tracts generally have a population size between 1,200 and 8,000 people, with an optimum size of 4,000 people. A census tract usually covers a contiguous area; however, the spatial size of census tracts varies widely depending on the density of settlement.” U.S. CENSUS BUREAU, *Geographic Terms and Concepts – Census Tract*, https://www.census.gov/geo/reference/gtc/gtc_ct.html.

Both the use of auctions and the requirement of a terrestrial license in connection with satellite operations should be rejected. However, even on its own terms, the proposal to use census tracts is highly inefficient and may not achieve the Commission's stated goal. There are more than twenty-three times as many census tracts as counties.⁷⁸ Because FSS operators had no way to anticipate that they would be required to hold terrestrial licenses based on census tracts, there is no reason to expect that their existing earth stations were located and constructed in a way that is optimized for that geographic area. For example, a gateway may be located near the edge of a census tract, or may even straddle the boundary. That geography might have no significance with respect to fixed operations located elsewhere in the BTA licensed to an LMDS operator, but could easily either expose 39 GHz earth stations to harmful interference from mobile base stations in adjacent areas or create the risk that 28 GHz FSS earth stations could cause harmful interference to terrestrial base stations nearby. It is odd that the Commission would consider the use of census tracts, given its conclusion in the *Notice* that counties would be an appropriate size to allow FSS operators to seek the protection they might desire through the UMFU licensee "without over or under excluding other uses or users."⁷⁹

The proposal fares no better from a legal perspective. As the *Notice* recognizes, the Open-market Reorganization for the Betterment of International Telecommunications Act (the "ORBIT Act") provides that "the Commission shall not have the authority to assign by

⁷⁸ See *Notice*, ¶ 110 (there are currently 3,143 counties and more than 74,000 census tracts).

⁷⁹ *Id.* ¶ 112. Yet even the use of counties, while perhaps preferable to census tracts for this purpose, might not provide sufficient protection. At present, because LMDS licenses are issued on a BTA basis, an FSS operator has no concern for whether its earth station is located near the border of a county or oriented toward the interior of a county or out toward its borders. If the Commission subdivides LMDS licenses, however, county lines would become critical.

competitive bidding orbital locations or spectrum used for the provision of international or global satellite communications services.”⁸⁰ Nonetheless, the Commission proposes to auction UMFU licenses, and to allow FSS licensees who acquire such licenses to protect their earth station operations in the licensed area. The *Notice* asserts that auctioning these licenses would not run afoul of the ORBIT Act’s prohibition because “an FSS provider taking advantage of this flexibility would be acquiring a terrestrial license, for terrestrial operations, that also has the effect of protecting a gateway in the service area by virtue of the right to exclude conferred through the license.”⁸¹ Unfortunately, implementing this reading of the statute leads to confusing and legally questionable results.

For example, the proposed rules impose build-out requirements on UMFU licensees. Specifically, proposed Section 30.105 provides that such licensees providing terrestrial mobile, point-to-multipoint, or point-to-point service, must demonstrate that they are providing reliable signal coverage and service to at least 40 percent of the population within the service area.⁸² The rule is silent with respect to licensees who hold a UMFU license solely to protect FSS operations. However, the *Notice* seeks comment on how best to incorporate satellite operations into a unified metric to be used to determine compliance with performance requirements,⁸³ and “what FSS licensees using Upper Microwave Flexible Use licenses in connection with FSS earth

⁸⁰ 47 U.S.C. § 765f.

⁸¹ *Notice*, ¶ 134. The Commission also made clear that earth stations would still require a license to operate under Part 25 of the Commission’s rules. *Id.*

⁸² Proposed rule 30.105(a) imposes a similar obligation on parties to partitioning and disaggregation agreements.

⁸³ *Notice*, ¶ 211.

stations would be required to show to demonstrate that the associated earth station was in operation and providing service.”⁸⁴

The Commission’s approach raises several questions, including the following:

1. If UMFU licenses relate only to terrestrial services, how can a licensee satisfy performance requirements with satellite operations?
2. If UMFU licenses relate only to terrestrial services, are licensees required to deploy terrestrial services sufficient to satisfy the performance requirements even if they only want to use the license to protect their FSS gateway operations?
3. The Commission has proposed operational limits for UMFU licensees on “the power of any emission outside a licensee’s frequency block” and the “median field strength at any location on the geographical border of a licensee’s service area.”⁸⁵ If UMFU licenses relate only to terrestrial services, do those limits apply to an FSS earth station? Do they override the provisions of its Part 25 authorization to the extent they are inconsistent?
4. The Commission has proposed to issue UMFU licenses for a ten-year term.⁸⁶ FSS earth station licenses have a fifteen year term.⁸⁷ What happens if the UMFU license expires while the FSS license remains in effect?
5. The Commission has proposed to retain the existing band plan in the 39 GHz band, composed of fourteen paired blocks of 50 megahertz channels, for use by UMFU licensees.⁸⁸ Would FSS operators who hold UMFU licenses in this band have to conform to the same band plan?
6. The Commission proposes that UMFU licensees would be required to comply generally with regulations applicable to other wireless communications services.⁸⁹ Does this obligation apply to FSS earth station operations?

⁸⁴ *Id.* ¶ 224.

⁸⁵ Proposed rules, Section 30.203 and 30.204.

⁸⁶ *See Notice*, ¶ 121.

⁸⁷ *See* 47 C.F.R. § 25.121(a)(1).

⁸⁸ *See Notice*, ¶ 117.

⁸⁹ *Notice*, ¶ 242.

The Commission staff has informally indicated that at least some of the requirements for terrestrial operations do not apply to FSS operations.⁹⁰ But that view is not consistent with the questions raised in the *Notice*. Nor is it consistent with the way the Commission has implemented the dual licensing regime in the 39 GHz band. As the Commission explained when TRW sought to use the terrestrial licenses it had acquired at auction to support an FSS service,

[a]ll operations under a 39 GHz EA license, including future operations of any FSS earth stations, must comply with the Part 101 rules governing the operation of the 39 GHz band. With regard to coordination, the same criteria as applied to terrestrial stations would be applied to earth stations Furthermore, an EA licensee, whether providing terrestrial or FSS earth station operations, must demonstrate substantial service at the time of its license renewal.⁹¹

Most importantly, the staff's informal advice is not binding. In this case, confusion arises because of the legal fiction the Commission has devised to maintain arguable compliance with the prohibitions of the ORBIT Act.

Rather than contort its rules in order to maintain this legal fiction, the Commission would be far better served by acknowledging the obvious – that FSS earth station operators should not be forced to purchase terrestrial licenses at auction in order to achieve a form of co-primary status with fixed and mobile systems in the band. Rather, the Commission should take the more straightforward approach of grandfathering earth stations licensed prior to the auction of 28 GHz and 39 GHz UMFU licenses, and adopting co-primary sharing criteria (such as first-in time, first-in right) for FSS and UMFU systems deployed thereafter. Such an approach would be not only

⁹⁰ See Letter from the Satellite Industry Association to Marlene H. Dortch, GN Docket No. 14-177, at 2 (filed Dec. 22, 2015) (recounting discussion of technical issue with the staff).

⁹¹ *TRW*, ¶ 12. As the Commission has noted, this auction-based regime and the *TRW* order were adopted before the ORBIT Act became law. See *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*, 18 FCC Rcd. 25428, n.46 (2003).

more consistent with the ORBIT Act, but also more likely to result in the intensive use of spectrum the Commission hopes to promote.

ii. Performance Requirements

a. Subdividing LMDS Licenses on a County Basis Should Not Prejudice Operators' Reasonable Expectations

As originally auctioned, LMDS licenses covered a BTA, typically composed of a fairly large number of counties. As part of its transition to UMFU licensing, the Commission proposes to subdivide existing LMDS licenses on a county basis.⁹² EchoStar does not object to this approach, with one very important caveat: the change in licensing geography should not prejudice the licensee's ability to meet the Commission's performance requirements that applied when those licensees acquired their licenses at auction.

Specifically, current LMDS licensees (such as Alta) are required to meet certain build-out requirements in order to renew their licenses. Those requirements apply BTA-wide, not county-by-county.⁹³ Accordingly, current LMDS licensees made their plans and constructed their facilities to satisfy those requirements as assessed within the entire BTA. At this point, they have already completed one renewal cycle where their performance requirements have been judged to be satisfied. If the Commission divides LMDS licenses into their constituent counties and applies build-out requirements to each county, it would radically alter the requirements that these licensees built into their auction bids and operational plans. It would also unnecessarily

⁹² *Id.* ¶ 115.

⁹³ *See* 47 C.F.R. § 101.1011(a) (must show substantial service "in their license area").

increase transaction costs by splitting some metropolitan areas and undermining the scale economies that many providers anticipated.

In these circumstances, the Commission should respect the reasonable expectations of existing LMDS licensees. For example, the Commission could subdivide the licenses on a county basis as proposed, but establish that the build-out requirements applicable to existing LMDS licensees will continue to be assessed on at BTA-wide basis.⁹⁴ The *Notice* proposes a version of this approach, but only for a very limited time.⁹⁵ If it uses this approach, the Commission should extend the applicable period indefinitely in recognition of LMDS licensees' reasonable expectations.

b. FSS Earth Stations Do Not Need New Performance Requirements

The Commission seeks comment on appropriate criteria for determining whether an earth station is operational. It apparently intends to apply such criteria both in the context of determining eligibility for the closed auction filing window⁹⁶ and in the context of determining satisfaction of ongoing performance requirements.⁹⁷ Yet there is no need to develop such criteria, even if the Commission goes forward with a dual licensing regime. Under Part 25 of the Commission's rules, earth station licensees are already obligated to complete construction and

⁹⁴ To the extent there were portions of their licensed areas that they did not wish to use, they could disaggregate their licenses with respect to any area of interest to another operator. EchoStar supports the Commission's proposal to allow UMFU licensees to disaggregate and partition their licenses. *See Notice*, ¶ 232.

⁹⁵ *See Notice*, ¶ 219 (proposing that current LMDS licensees be allowed to apply the existing performance requirement standard at the end of their current license terms, so long as the license term expires prior to March 1, 2021). Proposed Section 30.105(b) would codify this approach for existing 39 GHz licensees, but not for current LMDS licensees.

⁹⁶ *Notice*, ¶ 141.

⁹⁷ *Id.* ¶¶ 211, 213, and 224.

begin operation of their facilities within one year of licensing.⁹⁸ They must certify satisfaction of this requirement, and must thereafter remain in continuous operation unless the license is submitted for cancellation.⁹⁹ For purposes of the filing window, all licensed earth stations should qualify – and if they fail to commence and then continue operations, both their Part 25 and UMFU authorization would be cancelled. For purposes of performance requirements, the certification should be sufficient evidence of operation. Given that operation of the earth station is actually licensed under Part 25 – and the terrestrial UMFU license does not authorize satellite operations at all – there is no logical reason or legal basis to impose additional requirements under Part 30.

iii. The Use of Combinatorial Bidding for UMFU Licenses Would Unduly Prejudice FSS Interests

As discussed above, any linkage of auctioned UMFU licenses with FSS operations would be ill advised, if not illegal. But if the Commission were to continue down that path nonetheless, EchoStar does not favor combinatorial bidding, as it is systematically biased against bidders interested in only one or a small handful of licenses available at auction. The use of package bidding may discourage or preclude auction participation by such bidders for two reasons. First, bidders seeking an individual license have little chance of reaching an auction’s “threshold” when a large bidder has entered a package bid on a group of licenses that includes the individual license sought after by a smaller bidder. Even though the smaller bidder may actually value an individual license more than the larger bidder, the larger bidder’s “package” will net more gross

⁹⁸ See 47 C.F.R. § 25.133(a)(1).

⁹⁹ *Id.* at § 25.133(b)(1).

revenue and will thus be preferred over an aggregation of individual bids. Such a result does not reward the party that actually values a particular license the most, it simply rewards the one that is able to afford the largest license package.

Second, the complexity of combinatorial bid auctions adds significantly to the expense of participating in an auction. With innumerable combinations and packages mathematically possible, it takes considerable time and resources for a bidder to track and analyze the daily auction results. While nationwide companies bidding for large amounts of spectrum over large territories can justify such costs, those interested in only a few licenses will be overwhelmed by the prospect of hiring auction consultants and analyzing auction data for hours every day during a protracted auction process.

Accordingly, if FSS operators are to be required to hold UMFU licenses in order to protect their earth station operations, the Commission should not use combinatorial bidding in any auction of UMFU licenses.

D. TECHNICAL ISSUES

i. System Security

The Commission seeks comment on how to ensure that effective security features are built into key design principles for all UMFU communications devices and networks.¹⁰⁰ FSS operators have well-established security practices. Moreover, although FSS systems have been operating for decades, there is no indication that security issues have been a problem or are likely to become one. EchoStar appreciates the Commission's concern with security, but submits that there is no concern with respect to FSS operations that needs to be addressed.

¹⁰⁰ Notice, ¶¶ 260-61.

ii. Operating Parameters for UMFU Licensees

The *Notice* includes a number of proposals to regulate operating parameters of UMFU systems, ranging from power limits for base stations and mobile stations to limits on the field strength of transmissions at the border of a licensed area.¹⁰¹ These kinds of limitations are typical of the rules applicable to terrestrial wireless services, where licensees must coexist with common borders between their respective territories. They are not, however, typical of the rules applicable to satellite services, where licensees provide service nationwide, if not regionally or worldwide, and where transmissions are directed to and from space rather than toward users and base stations on the ground.

It is not entirely clear whether the operational rules proposed in the *Notice* would apply to FSS earth stations as well as terrestrial wireless operations. The Commission staff has informally indicated that such rules would not apply – a position that EchoStar endorses wholeheartedly. Because they are licensed under Part 25 of the Commission’s rules, FSS earth stations are already subject to operational rules established in that part. The operation of large gateway earth stations that communicate with satellites is radically different from the operation of multiple base stations and ubiquitous mobile units, and one would not expect these two very different architectures to be regulated by a common set of rules. Moreover, given that a UMFU license specifically does *not* authorize operation of an earth station,¹⁰² the operational rules adopted for UMFU licenses should *not* apply to earth stations.

¹⁰¹ See, e.g., *id.* ¶¶ 275-290.

¹⁰² See *id.*, ¶ 134 (“We emphasize, however, that an Upper Microwave Flexible Use license would not authorize operations of the FSS earth stations. The licensing of earth stations would continue to be governed by our Part 25 licensing rules.”).

As discussed above, it is difficult for any party in this proceeding to comment knowledgably about the parameters of a 5G service that has not yet been fully defined.

CONCLUSION

Like the Commission, EchoStar supports the goal of putting this nation's spectrum assets to intensive and productive use in order to continue to deliver innovative services to U.S. consumers. Because of their very different operational characteristics, FSS earth stations and terrestrial 5G systems should be able to share the spectrum above 24 GHz in a manner that achieves that end. However, rather than take the round-about auction-based approach discussed in the *Notice*, the Commission would be much better served by grandfathering existing FSS operations and adopting straightforward spectrum sharing rules similar to those that have worked in other bands for years. Doing so would ensure that all services allocated to these bands – and not just the incoming 5G services – would be able to thrive and provide U.S. consumers the broadband and other services they demand.

Respectfully submitted,

/s/ Deborah Broderson

Deborah Broderson
Director, Regulatory Affairs

ALTA WIRELESS, INC.
11717 Exploration Lane
Germantown, MD 20876
(301) 428-7140

/s/ Jennifer Manner

Jennifer A. Manner
Vice President, Regulatory Affairs
Alexander Gerdenitsch
Senior Principal Engineer,
Regulatory Affairs

ECHOSTAR SATELLITE OPERATING
CORPORATION
HUGHES NETWORK SYSTEMS, LLC
11717 Exploration Lane
Germantown, MD 20876
(301) 428-5893

January 27, 2016