



September 21, 2016

*By Electronic Filing*

Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 Twelfth Street, SW  
Washington, DC 20554

Re: Written *Ex Parte* Presentation  
OneWeb Petition for Declaratory Ruling  
IBFS File No. SAT-LOI-20160428-00041

Dear Ms. Dortch:

Pursuant to 47 C.F.R. § 1.1206, Hughes Network Systems, LLC (“Hughes”) and EchoStar Satellite Operating Corporation (together with their affiliates, “EchoStar”) submit this *ex parte* response to the above-referenced petition (“Petition”) by WorldVu Satellites Limited d/b/a OneWeb (“OneWeb”) seeking U.S. market access for its planned, U.K.-authorized non-geostationary satellite orbit (“NGSO”) fixed satellite service (“FSS”) system operating on a number of Ka- and Ku-band frequencies, including Ka-band uplink spectrum at 28.6-29.1 GHz and Ku-band downlink spectrum at 12.2-12.7 GHz.<sup>1</sup>

## **I. Introduction**

Today, more than one million hard-to-reach North American consumers enjoy satellite broadband service delivered over Hughes’ Ka-band geostationary satellite orbit (“GSO”) FSS network. This number is expected to grow significantly with the launch of JUPITER 2 in late 2016. The Commission should support the continued provision of this valuable consumer broadband offering, while facilitating the introduction of new satellite services that may compete with or complement Hughes’ Ka-band service.

Accordingly, if the Commission grants the Petition, it should include a condition requiring OneWeb to complete coordination on a co-primary basis with existing and future U.S.-licensed GSO FSS operations in the 28.6 – 29.1 GHz band. This would put both U.S.-licensed and non-U.S.-licensed GSO FSS systems in the band on the same footing for interference protection purposes, and is consistent with the co-primary GSO and NGSO FSS allocations for the band internationally.<sup>2</sup> This condition of grant also will not cause any undue burden on

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<sup>1</sup> See *Satellite Policy Branch Information: OneWeb Petition Accepted for Filing*, Public Notice, DA 16-804 (July 15, 2016); see also OneWeb Petition, IBFS File No. SAT-LOI-20160428-00041 (filed Apr. 28, 2016).

<sup>2</sup> The International Bureau previously denied a petition seeking a rulemaking to re-designate the 28.6-29.1 GHz uplink and 18.8-19.3 GHz downlink bands to allow co-primary GSO FSS operations. In doing so,

OneWeb's proposed NGSO deployment, given its stated global service plan and technical operating parameters.<sup>3</sup> Indeed, Hughes and OneWeb have been holding coordination discussions, and we expect that OneWeb will not oppose this condition. In general any future NGSO deployments would also not be subject to any undue burden by accepting co-primary status with the Hughes GSO existing and planned service.

Further, OneWeb should be required to submit additional information demonstrating that its proposed Ku-band operations will provide sufficient interference protection to Direct Broadcast Satellite ("DBS")/Broadcasting-Satellite Service ("BSS") operations in the 12.2-12.7 GHz band.

## **II. The Commission Should Require Additional Information Showing Sufficient Interference Protection to DBS/BSS at 12.2-12.7 GHz**

EchoStar has been unable to validate One Web's technical analysis and operational parameters to insure that these will adequately protect EchoStar's DBS/BSS operations in the 12.2-12.7 GHz band due to the fact that no sufficient supporting details have been provided with the analysis. With the large number of satellites proposed by OneWeb and with a system architecture that envisions a beam lay-out with a frequency re-use of at least 2x times, it is unclear that the OneWeb operational parameters will adequately protect EchoStar's operations.

Applying a basic analysis, the antenna discrimination for users in southern U.S. states may be negligible. Even if OneWeb switches off beams at elevation angles below 50 degrees, users will still experience significant levels of interference due to the high elevation angles of the BSS receivers (and subsequent low discrimination to the interference). Allowing mobile or transportable satellite service in this band as proposed by OneWeb would add the complicating factor of slant range as a function of geographic latitude with worse isolation performance of the portable phased array antenna systems.

Accordingly, EchoStar urges the FCC to require OneWeb to file the following technical information:

- A demonstration of compliance with epfd satellite limits in the 12.2 – 12.7 GHz band. Figures are provided claiming to show compliance with pfd limits for FS in the 10.7-11.7 GHz band, compliance with low-elevation pfd limits for MVDDS in the 12.2-12.7 GHz band, and compliance with epfd limits in various FSS bands up to 11.7 GHz, but none shows compliance with epfd limits in 12.2-12.7 GHz.

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the Bureau explained that launch of the O3b's Ka-band NGSO FSS system "removes the factual premise" for the requested rulemaking, and the petition "did not disclose sufficient reasons" to warrant a rulemaking. *See EchoStar Satellite Corp.*, Order, 29 FCC Rcd 14731, 14733 ¶ 4 (IB 2014). The Bureau decision, however, does not preclude the Commission from adopting Hughes' proposed condition in this non-rulemaking licensing proceeding or from granting a future similar petition for rulemaking based upon sufficient justification.

<sup>3</sup> See OneWeb Petition, Legal Narrative at 1-8, and Attachment A (Technical Information to Supplement Schedule S).

- A demonstration of protection of 12.2-12.7 GHz BSS. Sections of the OneWeb technical supplement address protection of 10.7-11.7 GHz FSS and FS, and of MVDDS in 12.2-12.7 GHz, but there is no discussion explaining how BSS receivers will be protected.
- A specification of the maximum downlink EIRP in the 12.2-12.7 GHz band. A figure of -13.4 dBW/4kHz<sup>4</sup> is provided in the Petition, labeled as applicable to all Ku-band downlinks. However, given the stricter protection requirements for the BSS band, the maximum EIRP would be expected to be reduced in the 12.2-12.7 GHz band to satisfy these requirements.
- Additional details regarding cessation of transmissions around the GSO orbit. The Petition describes that “(to comply with EPFD limits) certain Ku-band beams are turned off.”<sup>5</sup> However, there is no further detail or elaboration of this cessation strategy. Annex 1 contains a description of the software being developed by the ITU to assess compliance with Appendix 22 limits, and shows results from a preliminary version of such software, but does not provide the necessary operational parameters to permit replication of these results.
- Additional required emissions data. OneWeb’s Schedule S emissions data is incomplete. Specifically, emissions data for the 12.2-12.7 GHz beams (amongst many others) does not appear to be present in OneWeb’s Schedule S.
- Details of the analysis and geometry to validate that the amount of angular separation between the transmissions from the NGSO satellites (in the downlink bands) and user earth stations will provide the required discrimination.
- Details of the calculations of aggregate interference into a direct-to-home (“DTH”) receive terminal operating in the 12.2 -12.7 GHz band.
- Parameters taken into account for determining adjacent satellite interference such as cross-polarization performance of the satellite antenna.
- A specification of Ku-band off-axis emissions required to demonstrate that the the OneWeb user terminals will meet 47 C.F.R. § 25.118 or if OneWeb intends to apply 47 C.F.R. § 25.220.

### **III. Hughes Relies on Its Growing Fleet of High-throughput Ka-band Satellites to Provide Broadband to Consumers in North America**

As the nation’s leading satellite provider of consumer broadband services, Hughes’ growing fleet of next-generation, high-throughput Ka-band satellites delivers high-speed Internet

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<sup>4</sup> Attachment A, Technical Information to Supplement Schedule S: Section A.7 - Compliance with PFD limits, page 20

<sup>5</sup> Attachment A, Technical Information to Supplement Schedule S: Section A.4 - Geographic Coverage, page 16/17

services to more than one million customers in North America.<sup>6</sup> Today, these systems include SPACEWAY 3, the world's first commercial satellite with onboard switching and routing,<sup>7</sup> and JUPITER 1 (a/k/a EchoStar XVII), which allows for more efficient spectrum use and provides capacity in excess of 100 Gbps.<sup>8</sup>

In 2014 Hughes became the first satellite Internet provider to serve more than one million active customers.<sup>9</sup> The Hughes service is reaching customers in areas unserved or underserved by terrestrial broadband. This market is significant. As the Commission has noted, 34 million Americans live in areas that do not have terrestrial fixed, high-speed Internet access.<sup>10</sup> Hughes is leading the way to fill that void.

With the upcoming scheduled December 2016 launch of JUPITER 2 (a/k/a EchoStar XIX), another high-throughput Ka-band satellite, Hughes will further expand its satellite capacity for broadband Internet service in North America.<sup>11</sup> JUPITER 2 will provide advanced satellite broadband coverage across the United States, increase the Hughes network broadband speeds to 25 Mbps and beyond, and expand satellite capacity for service to customers. In addition, Hughes has under development a new terabit satellite, JUPITER 3, which should be launched and placed into commercial operation by decade's end.

#### **IV. The Commission Should Condition Any Grant to Ensure That OneWeb Adheres to the Same Coordination Rights and Obligations with Respect to U.S. and Non-U.S. Ka-band GSO FSS Systems**

The Commission should require OneWeb, as a condition of grant, to complete coordination on a co-primary basis with existing and future U.S.-licensed GSO FSS operations in the 28.6 – 29.1 GHz band. This condition will ensure the same coordination protections to U.S. GSO FSS systems that OneWeb – and any other future Ka-band NGSO FSS operators – must

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<sup>6</sup> See Hughes, Quarterly Report (Form 10-Q), at 33 (May 10, 2016).

<sup>7</sup> See PR Newswire, *Hughes' Next-Generation SPACEWAY 3 Satellite Successfully Launched* (Aug. 15, 2007), <http://www.prnewswire.com/news-releases/hughes-next-generation-spaceway-3-satellite-successfully-launched-58224077.html>.

<sup>8</sup> See Hughes, *EchoStar XVII: One of the World's Most Advanced High-throughput Satellites*, <http://www.hughes.com/technologies/satellites/echostar-xvii> (last visited Sept. 16, 2016).

<sup>9</sup> See HighBeam Research, *Hughes Becomes First Satellite Internet Provider to Surpass One Million Active Users* (Sept. 10, 2014), <https://www.highbeam.com/doc/1G1-395236770.html>.

<sup>10</sup> See Statement of Chairman Tom Wheeler, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, GN Docket No. 15-191 at 1 (Jan. 28, 2016) (“Americans increasingly rely on broadband for job opportunities, healthcare, education, public safety, and civic participation, but nearly 34 million Americans couldn’t get high-speed fixed broadband even if they wanted it”).

<sup>11</sup> See Caleb Henry, *EchoStar Excited About 2016 Launches, Musing Jupiter 3 Next Gen HTS*, Satellite Today (Feb. 25, 2016), <http://www.satellitetoday.com/launch/2016/02/25/echostar-excited-about-2016-launches-musing-jupiter-3-next-gen-hts/>.

provide to non-U.S. GSO FSS systems in compliance with international allocation rules. This condition also will ensure that existing and new satellite-based broadband services are able to coordinate to avoid harmful interference.

Under the Commission's 1996 Ka-band FSS allocation and service rules,<sup>12</sup> NGSO FSS systems such as the proposed OneWeb system are accorded primary status in the 28.6 – 29.1 GHz uplink band, while GSO FSS systems are permitted to operate on a secondary basis in the band.<sup>13</sup> Despite the Commission's designation of the 28.6 – 29.1 GHz band for NGSO FSS use on a primary basis, no NGSO FSS system operated in the band until O3b's launch of its first four satellites in June 2013.<sup>14</sup> To date, Hughes has successfully coordinated its Ka-band GSO FSS operations with O3b's NGSO FSS system. Without the requested condition, the proposed OneWeb system and other future Ka-band NGSO FSS deployments risk complicating the Ka-band interference environment and adversely affecting Hughes's existing and planned GSO FSS operations in the band.

The Commission's 20-year old designation of the 28.6 – 29.1 GHz band for primary NGSO and secondary GSO use was based on technical assumptions that are no longer applicable. In explaining its decision back in 1996, the Commission stated that “[u]ntil such time as studies are completed in the ITU-R [International Telecommunication Union - Radiocommunication Sector], we cannot conclude that co-frequency sharing is possible between GSO/FSS systems and NGSO/FSS systems and therefore a separate band designation is warranted.”<sup>15</sup> Those ITU-R studies on co-frequency GSO/NGSO FSS sharing were subsequently completed and provided a basis for the Commission's finding in 2000 that solutions exist “to allow NGSO FSS operations to share successfully with GSO FSS networks without causing unacceptable interference.”<sup>16</sup>

In fact, this co-primary shared approach to the band is in place across the globe (other than the United States) in this and other frequency bands. Internationally, the 28.6 – 29.1 GHz

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<sup>12</sup> See *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005 (1996) (“*First Ka-band Order*”), modified by Third Report and Order, 12 FCC Rcd 22310 (1997) (“*Third Ka-band Order*”).

<sup>13</sup> See 47 C.F.R. §§ 2.106 (U.S. Table of Frequency Allocations), 25.202(a)(1) n.5; see also *Third Ka-band Order*, 12 FCC Rcd at 22326-28 ¶¶ 40, 42-43.

<sup>14</sup> See O3b Networks, *O3b Takes Control of First Satellites, as In-orbit Testing Successfully Completed*, <http://www.o3bnetworks.com/o3b-takes-control-first-satellites-orbit-testing-successfully-completed/> (July 30, 2013).

<sup>15</sup> *First Ka-band Order*, 11 FCC Rcd at 19030 ¶ 59.

<sup>16</sup> *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, First Report and Order and Notice of Proposed Rulemaking, 16 FCC Rcd 4096, 4128 ¶ 72 (2000) (“*Ku-band Order*”). Although the ITU-R studies on co-frequency GSO/NGSO FSS sharing support sharing solutions for both the Ka-band and Ku-band, the Commission to date has adopted rules allowing GSO/NGSO FSS sharing in the Ku-band only. See *id.* ¶ 1.

band is allocated to both GSO and NGSO FSS systems on a co-primary basis. Specifically, Footnote 5.523A of the International Table of Allocations provides that, with the exception of certain grandfathered GSO networks, the band may be used by both NGSO and GSO FSS systems, subject to the coordination rules of Article 9 of the ITU Radio Regulations.<sup>17</sup> In other words, notwithstanding Section 25.202 of the FCC's rules, OneWeb is required under ITU rules (and by countries other than the United States) to share co-primary use of the 28.6 – 29.1 GHz band and coordinate with GSO operations in the band for the purpose of avoiding harmful interference. Moreover, NGSO FSS systems in other frequency bands such as the Ku-band are subject to international and FCC limits on equivalent power flux density limits to ensure co-frequency sharing with GSO FSS systems.<sup>18</sup>

Furthermore, the proposed condition will not burden OneWeb. OneWeb states that its NGSO system has been designed to provide interference protection to GSO satellite networks in both Ku-band and Ka-band, as required under Article 22 of the ITU Radio Regulations.<sup>19</sup> OneWeb further explains that the “principle used to protect GSO satellite networks from Ka-band interference from OneWeb is the simple GSO arc avoidance approach,”<sup>20</sup> such that “interference to Ka-band GSO satellite networks can be prevented without significant burden on the OneWeb design or operations.”<sup>21</sup>

Moreover, OneWeb's satellite receivers should be reasonably designed as a technical matter to tolerate the same interference level received from any U.S. or non-U.S. GSO FSS gateway earth station. Thus, having OneWeb accept the same interference level received from both U.S. and non-U.S. GSO FSS would not require any technical modification of OneWeb's satellite receivers or impose any cost burden. Indeed, discussions with OneWeb have led to an understanding of how both systems can operate to avoid interference. The requested condition would serve to confirm that arrangement and set the ground work for this approach with regard to future Ka-band NGSO systems as well.

Finally, the same logic and design could apply to any future NGSO services planned for the 28.6-29.1 GHz spectrum, where co-primary status with existing and planned Hughes GSO services would not cause any undue burden to their operations.

## V. Conclusion

Based upon the foregoing, the Commission should adopt a condition, as proposed above, requiring OneWeb to complete coordination on a co-primary basis with existing and future U.S.-

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<sup>17</sup> See 47 C.F.R. § 2.106 n.5.523A. By excluding the application of Article 22.2 of the ITU Radio Regulations (which makes NGSO systems generally secondary to GSO systems), Footnote 5.523A effectively promotes NGSO systems in the 18.8-19.3 GHz and 28.6-29.1 GHz bands to co-equal status with GSO systems.

<sup>18</sup> See *Ku-band Order*, 16 FCC Rcd at 4100 ¶ 2.

<sup>19</sup> OneWeb Petition, Attachment A: Technical Information to Supplement Schedule S at 28.

<sup>20</sup> *Id.* at 34.

<sup>21</sup> *Id.* at 33.

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licensed GSO FSS operations in the 28.6 – 29.1 GHz band. With the proposed condition, grant of U.S. market access for the OneWeb system will allow deployment of new NGSO satellite broadband services to U.S. consumers, while protecting existing and future broadband services provided by Hughes and other GSO FSS operators. In addition, EchoStar urges the FCC to require OneWeb to provide additional technical information demonstrating that its proposed Ku-band operations will provide sufficient interference protection to DBS/BSS operations in the 12.2-12.7 GHz band.

Respectfully Submitted,

/s/ Jennifer A. Manner

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