

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of

Hughes Network Systems, LLC

Petition for Declaratory Ruling Granting  
Access to the U.S. Market for the HVNET  
V-band Non-geostationary Orbit Fixed  
Satellite System

File No. SAT-PDR-20211104-\_\_\_\_\_

Call Sign S\_\_\_\_\_

**PETITION FOR DECLARATORY RULING**

**I. INTRODUCTION**

Pursuant to Sections 25.137 and 25.157 of the Commission’s rules,<sup>1</sup> Hughes Network Systems, LLC (“Hughes”) submits this petition (“Petition”) for declaratory ruling granting access to the U.S. market for a new non-geostationary orbit (“NGSO”) fixed satellite service (“FSS”) system (the “HVNET System” or “System”) to operate in the 37.5-42.0 GHz (downlink), 47.2-50.2 GHz (uplink), and 50.4 – 51.4 GHz (uplink) bands (collectively, the “V-band”). With a constellation of 1,440 satellites in 36 low Earth orbit (“LEO”) planes at an altitude of 1,150 kilometers, the HVNET System will provide substantial public interest benefits by facilitating more intensive satellite spectrum use and delivering ubiquitous, low-latency, high-speed broadband services to enterprise, government, and residential consumers throughout the United States and around the world.

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<sup>1</sup> See 47 C.F.R. §§ 25.137, 25.157; see also *Satellite Policy Branch Information: Cut-off Established for Additional NGSO-like Satellite Systems in the 37.5-40.0 GHz, 40.0-42.0 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz Bands*, Public Notice, DA 21-941 (Aug. 4, 2021).

## II. GRANT OF THIS PETITION SERVES THE PUBLIC INTEREST

### A. Hughes' Satellite Broadband Experience and Leadership

With 50 years of experience in the satellite industry, Hughes has the technical and business expertise and resources to successfully construct, launch, and operate its proposed System. Since its successful August 2007 launch of the first modern-era broadband satellite,<sup>2</sup> Hughes' broadband experience has expanded to include both geostationary orbit ("GSO") and NGSO satellite operations. Today, Hughes operates a fleet of broadband GSO satellites to provide Commission-defined broadband services to more than 1.5 million users across the Americas. Its U.S.-licensed next-generation, ultra-high-density broadband satellite, Jupiter 3 (also known as EchoStar XXIV), is planned for launch in the second half of 2022. Delivering speeds of up to 100 Mbps, Jupiter 3 will supplement Hughes' existing broadband capacity to provide service to a variety of subscribers, including government agencies, business enterprises, and residential consumers, across the United States and the Americas.

Additionally, Hughes has significant broadband NGSO experience. Hughes has worked extensively with GlobalStar and other NGSO operators over the years to develop technologies for their ground systems.<sup>3</sup> More recently, Hughes has been manufacturing and deploying the terrestrial component of OneWeb's broadband LEO network.<sup>4</sup>

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<sup>2</sup> See Press Release, Response Source, *Hughes' Next-Generation SPACEWAY 3 Satellite Successfully Launched* (Aug. 15, 2007), <https://pressreleases.responsesource.com/news/33155/hughes-next-generation-spaceway-3-satellite-successfully-launched/>.

<sup>3</sup> See Globe Newswire, *Globalstar Signs Contract with Hughes to Pave Way for Next Generation Advanced Satellite Services* (May 19, 2008), <https://www.globenewswire.com/news-release/2008/05/19/378544/9076/en/Globalstar-Signs-Contract-With-Hughes-to-Pave-Way-for-Next-Generation-Advanced-Satellite-Services.html>.

<sup>4</sup> See Press Release, Hughes, *Hughes Selected by OneWeb for Ground System Development and Production Under New \$250 Million Contract* (Dec. 16, 2020), <https://www.hughes.com/resources/press-releases/hughes-selected-oneweb-ground-system-development-and-production-under-new>.

Hughes' innovation and leadership in the commercial satellite industry includes:

- developing the first TDMA network over satellite;
- inventing, developing, and deploying the first VSAT network;
- developing and deploying the first ground-based beam-forming satellite network;
- deploying the first commercial beam-hopping, phased-array satellite;
- delivering the first commercial Internet service over satellites for consumer web surfing with protocol performance enhancement proxy and acceleration techniques;
- providing service as the first satellite-based Internet provider to meet the Commission's definition of broadband and as the only service provider to exceed advertised data rates; and
- deploying the first GSO mobile satellite service ("MSS") network with dual-mode satellite-cellular handsets.

Hughes also has developed and contributed novel technologies to the industry's advancement of satellite communication technologies and international standards, including:

- 3GPP, rel. 17, which includes non-terrestrial network fifth generation wireless ("5G") standards;
- Digital Video Broadcast via Satellite, 2<sup>nd</sup> Generation and its extensions (*i.e.*, DVB-S2 and DVB-S2X), used worldwide by nearly all satellite networks after its introduction in 2004; and
- Geo-synchronous satellite Mobile Radio 1 (*i.e.*, GMR-1 and its 3<sup>rd</sup> generation extension GMR-1 3G).

Hughes' industry experience and resources thus demonstrate its commitment to successfully launching a new broadband NGSO satellite system and delivering innovative services to consumers.

## **B. Description of the System**

***Space and ground segments.*** The HVNET System consists of a constellation of 1,440 LEO satellites operating in 36 orbital planes at an altitude of 1,150 kilometers, with optical inter-satellite links ("ISLs") for communications between adjacent satellites in-plane and cross-plane.

The System further includes a network of approximately 20 to 40 gateway earth stations strategically located around the world for operations with the LEO satellites to provide low-latency, high-speed broadband service to ubiquitously deployed user terminals in the United States and virtually globally.<sup>5</sup> A more detailed description of the System, including the LEO satellite constellation, gateways, and user terminals, is provided in the attached Schedule S and Technical Appendix.

*Operating frequencies.* The HVNET System will operate in the V-band, as set forth in Table 1 below. A more detailed description of the frequency plan for the System is provided in the attached Schedule S and Technical Appendix.

**Table 1: Proposed V-band Operations**

<b>Frequencies (GHz)</b>	<b>Proposed Operations</b>
37.5 – 40.0	Satellite-to-gateway downlink (including TT&C at 37.5-37.6 GHz)
40.0 – 42.0	Satellite-to-gateway downlink (including TT&C at 41.9-42.0 GHz)  Satellite-to-user downlink
47.2 – 48.2	Gateway-to-satellite uplink (including TT&C at 47.2-47.3 GHz)
48.2 – 50.2	User-to-satellite uplink  Gateway-to-satellite uplink (including TT&C at 50.1-50.2 GHz)
50.4 – 51.4	Gateway-to-satellite uplink

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<sup>5</sup> Hughes will seek any additional required authorizations to operate gateways and user terminals in the United States. See 47 C.F.R. §§ 25.115, 25.136.

### **C. Public Interest Benefits**

Deploying its proposed System will enable Hughes to provide the coverage and capacity needed to bring innovative broadband, including 5G services, to enterprise, government, and residential customers in the United States and abroad. As the COVID-19 pandemic has shown, broadband is critical to facilitate health, education, work, and government operations and services for everyone, wherever they may be. The HVNET System is designed to meet these demands on a spectrally efficient basis, with a focus on serving business enterprises, government agencies, and residential consumers.

The HVNET System design builds on the future of a 5G world based on a network of networks. Hughes has already deployed hybrid satellite-terrestrial networks to meet the needs of its enterprise customers and anticipates deploying such hybrid networks for its consumer base next year. The System builds on this work by enabling Hughes to offer a combination of NGSO, GSO, and terrestrial network capabilities, as needed by its customers. This flexibility will ensure that customers, including business enterprises, government agencies, and residential consumers, will have the 5G capabilities needed for any applications, including video streaming, real-time interactive communications, and machine-to-machine operations.

The System is designed to deliver broadband connectivity with new advanced features. Notably, the LEO satellites will enable Hughes to deliver low-latency transmissions at speeds of more than 1 Gbps, and extend global coverage to include underserved areas of Alaska, Hawaii, Puerto Rico, the U.S. Virgin Islands, Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa. Using phased array beams and on-board digital processing, the System also offers both flexible coverage to areas most in demand and greater network capacity and density. Additionally, the System is spectrally efficient by relying on optical ISL technologies for intra-system communications between satellites. Optical ISLs will enable less

use of ground infrastructure, thus saving costs. Consequently, the HVNET System will be a key part of Hughes' plans for a multi-orbit, multi-technology network, allowing greater reach, lower latency, and higher-speed services to users in the United States and abroad.

### **III. LEGAL AND TECHNICAL QUALIFICATIONS**

Hughes' legal qualifications are set forth in this Petition, including the accompanying FCC Form 312 and exhibits, and its qualifications as an established Commission-licensed satellite operator are a matter of record before the Commission. Additionally, the accompanying Schedule S and Technical Appendix provide technical information required under the Commission's Part 25 rules, and further demonstrate Hughes' technical qualifications.

#### **A. Compliance with Licensing, Service, and Technical Rules**

Hughes highlights below its compliance with applicable licensing, service, and technical requirements under the Commission's Part 25 rules.

***U.S. Market Access.*** The HVNET System will operate pursuant to German filings with the International Telecommunication Union ("ITU") and under German licensing authority. Thus, under Section 25.137(c) of the Commission's rules, this Petition qualifies for Commission consideration in the current V-band NGSO processing round.<sup>6</sup>

Additionally, under Section 25.137(a)(2) and the Commission's *DISCO II* policies,<sup>7</sup> U.S. market access requests for satellites authorized by World Trade Organization ("WTO") member

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<sup>6</sup> See 47 C.F.R. § 25.137(c)(2)-(3) (permitting contemporaneous NGSO processing round consideration of a U.S. market access request for an NGSO satellite system that "[h]as a license from another administration; or [h]as been submitted for coordination to the [ITU]"); see also *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States*, Report and Order, 12 FCC Rcd 24094, ¶ 196 (1997) ("*DISCO II Order*") ("we will not require a license as a prerequisite to participating in a U.S. space station processing round"), *on recon.*, 15 FCC Rcd 7207 (1999) ("*DISCO II First Reconsideration Order*"), *recon. denied*, 16 FCC Rcd 19794 (2001).

<sup>7</sup> See 47 C.F.R. § 25.137(a)(2); *DISCO II Order* ¶ 29.

countries to provide “WTO-covered” services, including FSS and MSS, to the United States are presumed to enhance competition and serve the public interest.<sup>8</sup> Accordingly, as the HVNET System will operate under ITU filings and authorization from Germany, a WTO member country, to provide WTO-covered satellite service to the United States, grant of this Petition is presumed to be pro-competitive and in the public interest.

Furthermore, grant of this Petition satisfies other public interest considerations for granting market access, including spectrum availability, national security, law enforcement, and foreign and trade policy concerns.<sup>9</sup> Specifically, in considering spectrum availability, the Commission assesses whether granting access would cause harmful interference to U.S.-licensed satellite and terrestrial operations.<sup>10</sup> As further noted below and demonstrated in the attached Technical Appendix, the HVNET System’s proposed spectrum use is consistent with the Commission’s allocations rules and V-band plan, as well as technical and coordination requirements to protect terrestrial and other satellite operations. Thus, grant of this Petition will have no adverse impact on spectrum availability. Additionally, nothing in this Petition raises any national security, law enforcement, foreign policy, and trade policy concerns, consistent with the Commission’s finding that such issues may be raised “only in very rare circumstances.”<sup>11</sup>

***Spectrum use.*** The HVNET System’s proposed FSS use of V-band spectrum is consistent with the Commission’s allocations and service rules, including its V-band plan.<sup>12</sup>

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<sup>8</sup> See 47 C.F.R. § 25.137(a)(2); *DISCO II Order* ¶ 39.

<sup>9</sup> See *DISCO II Order* ¶¶ 146-82.

<sup>10</sup> See *id.* ¶¶ 149-50.

<sup>11</sup> See *DISCO II Order* ¶ 180.

<sup>12</sup> See 47 C.F.R. §§ 2.106, 25.136, 25.202(a)(1); see also *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*, Second Report and Order, 18 FCC Rcd 25428 (2003) (updating the Commission’s band plan for satellite and terrestrial use of V-band spectrum).

Specifically, the 37.5-40.0 GHz band is allocated to FSS downlink use on a primary basis, but limited to communications with individually licensed earth stations, including gateways, and further subject to Section 25.136's provisions for sharing with terrestrial upper microwave flexible use ("UMFU") operations.<sup>13</sup> The 40-42 GHz band is also allocated to and reserved for FSS downlink use on a primary basis.<sup>14</sup> Additionally, the 47.2-48.2 GHz and 50.4-51.4 GHz bands are allocated to FSS uplink use on a primary basis, but limited to individually licensed earth station operations and further subject to Section 25.136's UMFU sharing provisions.<sup>15</sup> The 48.2-50.2 GHz band is also allocated to and reserved for FSS uplink use, including for blanket-licensed earth stations, on a primary basis.<sup>16</sup>

Accordingly, the proposed FSS downlink use of the 37.5-42.0 GHz band and FSS uplink use of the of 47.2-50.2 GHz and 50.4-51.4 GHz bands are consistent with the Commission's rules. As further demonstrated in the attached Technical Appendix, the proposed V-band NGSO FSS operations is also consistent with the Commission's applicable technical and coordination requirements to protect terrestrial and other satellite operations in the band.<sup>17</sup>

***Milestone and bond.*** Hughes will implement its System in compliance with the Commission's milestone and surety bond requirements.<sup>18</sup>

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<sup>13</sup> See 47 C.F.R. §§ 2.106, 25.136(b)-(c), 25.202(a)(1)(ii).

<sup>14</sup> See 47 C.F.R. § 2.106; *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Memorandum Opinion and Order, 32 FCC Rcd 10988, ¶ 192 (2017) ("*Spectrum Frontiers MO&O*").

<sup>15</sup> See 47 C.F.R. §§ 2.106, 25.136(d)-(e); *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Second Report and Order, 32 FCC Rcd 10988, ¶¶ 54-56 (2017); *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Fifth Report and Order, 34 FCC Rcd 2556, ¶¶ 10-12 (2019).

<sup>16</sup> See 47 C.F.R. § 2.106; *Spectrum Frontiers MO&O* ¶ 189.

<sup>17</sup> See 47 C.F.R. §§ 2.106, 25.202(a).

<sup>18</sup> See *id.* §§ 25.164(b), 25.165.



***Other V-band NGSO systems and applications.*** Hughes affirms that it has no licensed-but-unbuilt V-band NGSO satellite system and no other application for a V-band NGSO satellite system pending before the Commission.<sup>19</sup>

***Sharing with other NGSO FSS systems.*** Hughes affirms that it will coordinate in good faith with other authorized V-band NGSO FSS operators and, absent such coordination, will operate its System in accordance with the Commission’s default sharing procedures.<sup>20</sup>

***Telemetry, tracking, and command (“TT&C”) transmissions.*** As demonstrated in the attached Technical Appendix, TT&C downlink transmissions at 37.5-37.6 GHz and 41.9-42.0 GHz, as well as TT&C uplink transmissions at 47.2-47.3 GHz and 50.1-50.2 GHz, will cause no greater interference and require no greater interference protection than non-TT&C transmissions.<sup>21</sup> Additionally, TT&C frequencies, polarization, and coding are selected to minimize interference to other satellite networks.<sup>22</sup>

***Orbital debris mitigation and end-of-life disposal.*** As noted above, the HVNET System will operate under authorization from Germany, and thus Hughes’ debris mitigation plan for the System is subject to Germany’s direct and effective regulatory oversight. Accordingly, the Commission’s debris mitigation requirements are satisfied here.<sup>23</sup> Nonetheless, as demonstrated in the attached Technical Appendix, Hughes’ debris mitigation plan is consistent with the Commission’s existing debris mitigation and end-of-life disposal requirements.<sup>24</sup> Hughes will

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<sup>19</sup> See *id.* § 25.159(b).

<sup>20</sup> See *id.* § 25.261.

<sup>21</sup> See *id.* § 25.202(g)(1).

<sup>22</sup> See *id.* §§ 25.202(g)(2).

<sup>23</sup> See *id.* § 25.114(d)(14)(v).

<sup>24</sup> See *id.* §§ 25.114(d)(14), 25.283.

seek and obtain Commission approval of any plan modifications to the extent required to comply with the Commission’s revised debris mitigation rules following the effectiveness of those rules.<sup>25</sup>

***ITU cost recovery.*** Hughes affirms and unconditionally accepts responsibility for payment of all ITU cost recovery fees associated with this Petition.<sup>26</sup>

#### **B. Request for Waiver**

Hughes requests a limited waiver of Section 25.114(c)(4)(vi)(B)’s requirement to provide on Schedule S all antenna gain contours plotted at 2 dB intervals down to 10 dB below the peak gain and at 5 dB intervals between 10 dB and 20 dB below the peak gain.<sup>27</sup> For TT&C omni antennas (identified as “TT1L” and “TT1R” in the attached Schedule S), Hughes is unable to provide all contours required under the rule because some of these contours (*i.e.*, contours between 15 dB and 20 dB below the peak gain) fall entirely beyond the edge of the visible Earth. As Section 25.114(c)(4)(vi)(A) permits GSO applicants to omit contours falling entirely beyond the edge of the visible Earth,<sup>28</sup> the Commission should allow Hughes similar flexibility to exclude such contours from its Schedule S submission for TT&C omni antennas.

#### **IV. CONCLUSION**

Based upon the foregoing, grant of U.S. market access for the proposed HVNET System serves the public interest and is consistent with the Commission’s Part 25 rules. Accordingly, the Commission should expeditiously grant this Petition to facilitate more intensive NGSO

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<sup>25</sup> See *Mitigation of Orbital Debris in the New Space Age*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156 (Apr. 24, 2020) (“*Debris Mitigation Order*”).

<sup>26</sup> See *id.* § 25.111(d).

<sup>27</sup> See 47 C.F.R. § 25.114(c)(4)(vi)(B).

<sup>28</sup> See *id.* § 25.114(c)(4)(vi)(A).

spectrum use and deployment of new satellite broadband connectivity to all areas of the United States and the world, including underserved areas of Alaska, Hawaii, Puerto Rico, the U.S. Virgin Islands, Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa.

Respectfully submitted,

**HUGHES NETWORK SYSTEMS, LLC**

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