

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

In the Matter of	)	
	)	
WorldVu Satellites Limited	)	IBFS File No. SAT-LOI-20160428-
	)	00041
Petition for a Declaratory Ruling Granting	)	
Access to the U.S. Market for the OneWeb	)	
System	)	
	)	

**MVDDS 5G COALITION REPLY TO OPPOSITION AND RESPONSE OF WORLDTVU  
SATELLITES LIMITED**

September 1, 2016

**TABLE OF CONTENTS**

**I. INTRODUCTION AND SUMMARY..... 1**

**II. ONEWEB HAS ONCE AGAIN FAILED TO PROVIDE A BUSINESS JUSTIFICATION AS TO WHY IT NEEDS THE 12.2-12.7 GHZ BAND..... 5**

**III. ONEWEB’S ENTIRE PLAN HINGES ON MOBILE AND PROPOSES USES NON-COMPLIANT WITH THE COMMISSION’S RULES..... 7**

**IV. THE COALITION’S TECHNICAL ANALYSIS IS CORRECT ..... 10**

**V. ONEWEB’S BELATED DISCLOSURE OF A SINGLE RECEIVER PERFORMANCE CHARACTERISTIC IS INADEQUATE AND DOES NOT CHANGE THE RESULTS OF THE MVDDS COALITION’S TECHNICAL ANALYSIS ..... 14**

**VI. ONEWEB MISREPRESENTS THE MVDDS COALITION’S STATEMENTS ABOUT THE EFFECT OF NGSO FSS TRANSMITTERS ON MVDDS OPERATIONS IN THE 12.2-12.7 GHZ BAND..... 16**

**VII. CONCLUSION ..... 17**

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

In the Matter of	)	
	)	
WorldVu Satellites Limited	)	IBFS File No. SAT-LOI-20160428-
	)	00041
Petition for a Declaratory Ruling Granting	)	
Access to the U.S. Market for the OneWeb	)	
System	)	

**MVDDS 5G COALITION REPLY TO OPPOSITION AND RESPONSE OF WORLDVU  
SATELLITES LIMITED**

Pursuant to Section 25.154 of the Commission’s rules,<sup>1</sup> the MVDDS 5G Coalition (the “Coalition”)<sup>2</sup> submits this Reply to the Opposition and Response of WorldVu Satellites Limited (“OneWeb”).

**I. INTRODUCTION AND SUMMARY**

The Commission should deny OneWeb’s request for the authority to use a small portion of the 5,900 MHz covered by its application in the 12.2-12.7 GHz band for OneWeb’s proposed 720-satellite system. OneWeb’s Opposition does not offer any basis other than OneWeb’s own say-so in support of its need for these vast spectrum reserves. OneWeb has requested authority to operate across an amount of spectrum much larger than that licensed to most other satellite operators. But it seeks to justify this gargantuan request with a backhanded reference to “various

---

<sup>1</sup> 47 C.F.R. § 25.154.

<sup>2</sup> The Coalition includes a cross-section of multichannel video distribution and data service (“MVDDS”) and direct broadcast satellite (“DBS”) licensees holding authorizations in the 12.2-12.7 GHz band, including: Braunston Spectrum LLC, Cass Cable TV, Inc., DISH Network L.L.C., GO LONG WIRELESS, LTD., MDS Operations, Inc., MVD Number 53 Partners, Satellite Receivers, Ltd., SOUTH.COM LLC, Story Communications, LLC, Vision Broadband, LLC, and WCS Communications, Inc.

regulatory issues ... in different parts of the world” and an allusion to the fact that another 1,000 MHz of its request is also used by terrestrial services.

First, OneWeb has not demonstrated its need for the entire spectrum it is seeking. There are a number of methods for demonstrating spectrum requirements.<sup>3</sup> But one thing is certain: six lines of dismissive text are not enough. OneWeb must answer a myriad of questions about the projected take rate for its service in the U.S. and elsewhere, and peak and average demand for capacity for each projected user.

Second, it is axiomatic that the Commission must evaluate an applicant’s proposal in its entirety. OneWeb’s website and promotional material brim with its plans to provide service to mobile terminals, which seem an integral, and perhaps the most important, part of its business. “Wherever you go, your mobile network will follow,” OneWeb gushes to consumers.<sup>4</sup> Yet astonishingly, OneWeb’s Opposition discusses mobile terminals in one footnote, and only to say that the time is not yet ripe for the Commission to evaluate the issues surrounding mobile service. OneWeb intends to deploy a fully integrated system. The company cannot postpone consideration of the system’s most potentially damaging components until some later date. Instead, OneWeb must provide information about all relevant components of its system or Commission processing of OneWeb’s application must end.

A waiver of the Table of Allocations to allow non-conforming use is also required.

OneWeb’s only footnote on the question of mobile terminals states, mystifyingly, that “[t]his

---

<sup>3</sup> See, e.g., ITU-R Rec. M.1768, Methodology for calculation of spectrum requirements for the future development of the terrestrial component of IMT-2000 and systems beyond IMT-2000 (Apr. 2013); ITU-R Report M.2079, Technical and operational information for identifying spectrum for the terrestrial component of future development of IMT-2000 and IMT-Advanced (Aug. 2006); ITU-R Rec. M.1645, Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000 (2003).

<sup>4</sup> OneWeb, <http://oneweb.world/#use>.

matter was fully addressed in the FCC’s letter requesting additional information and OneWeb’s response.”<sup>5</sup> The FCC’s letter suggests that a waiver is necessary to deploy mobile terminals.<sup>6</sup> And OneWeb’s response did not “fully address” this matter except by trying to relegate it to some distant future – the same attempt OneWeb is making here. But OneWeb cannot prove its arguments based on the fact that it has made them before. The time to request Commission authority to provide mobile service and a waiver is now.

Third, the technical analysis submitted by the Coalition showed that NGSO and MVDDS systems cannot coexist in the 12.2-12.7 GHz band.<sup>7</sup> The Coalition’s Petition to Deny included a detailed technical report analyzing the potential for sharing between MVDDS and NGSO. That analysis demonstrated that grant of OneWeb’s Petition in the 12.2-12.7 GHz band would essentially destroy any realistic prospect of Multichannel Video Data and Distribution Service (“MVDDS”) rollout. It would likely cause harmful interference from MVDDS to NGSO satellite receivers and, depending on OneWeb’s ultimate satellite configuration, the potential for harmful interference from NGSO satellites into MVDDS receivers. It also established that OneWeb’s proposed *mobile*, ubiquitous service covering the entire United States, would make the death blow to MVDDS that much more definitive, as a serious interference problem becomes even worse.

OneWeb does not offer its own technical analysis in response. Rather, OneWeb offers snippets dismissing the Coalition’s rigorous analysis without any explanation. Thus, OneWeb

---

<sup>5</sup> Opposition and Response of WorldVu Satellites Limited, IBFS File No. SAT-LOI-20160428-0004, at 15 n.40 (Aug. 25, 2016) (“OneWeb Opposition”).

<sup>6</sup> See Letter from Jose Albuquerque, Chief, Satellite Division, International Bureau, FCC, to Kalpak Gude, Vice President of Legal-Regulatory, WorldVu Satellites Limited, at 2 (June 10, 2016) (“Albuquerque Letter”).

<sup>7</sup> Tom Peters, MVDDS 12.2-12.7 GHz NGSO Coexistence Study at 18-19 (Aug. 15, 2016) (Exhibit 1 to Coalition Petition to Deny) (“MVDDS/NGSO Technical Analysis”).

invents a tension between the Coalition’s conclusions that, on the one hand, MVDDS can share the spectrum with DBS systems and that, on the other, no such sharing is possible with NGSO systems. There is no tension. OneWeb strangely faults the propagation model used by the Coalition to calculate interference into DBS as too unusually *accurate*, and mocks it as “exploit[ing] every last morsel of terrain and building attenuation.”<sup>8</sup> In fact, the model represents standard practice for terrestrial network design, and the use of light detection and ranging (“LiDAR”) data only improves its accuracy in areas where there is building clutter, an improvement that OneWeb does not contest. As for the MVDDS-into-NGSO case study, it is not true that the Coalition “relies on a clearly inappropriate free space interference model”<sup>9</sup> to conclude MVDDS would cause terrestrial interference into NGSO terminals. In fact, the Coalition’s MVDDS/NGSO Technical Analysis also relied on the Longley-Rice signal propagation method using an average terrain of 90 meters, which militates for greater signal attenuation, and therefore even less interference than would be the case in a flat topography.<sup>10</sup> In that case study, the Coalition did not use LiDAR data because OneWeb receivers will be mobile (unlike DBS antennas, which are fixed), and are also not constrained to the rooftop locations typical of DBS antennas in urban environments.

For the first time in its Opposition, OneWeb makes the remarkable claim that its antenna boast an isolation of 40 dB, a claim as undocumented and doubtful as it is non-dispositive. And OneWeb sets up a strawman – that the Coalition has argued OneWeb’s systems as proposed would not meet the PFD limits of the Commission’s rules. The Coalition has made no such argument. OneWeb tries to deflect the argument that the Coalition did make: if OneWeb were

---

<sup>8</sup> OneWeb Opposition at 15.

<sup>9</sup> *See id.*

<sup>10</sup> MVDDS/NGSO Technical Analysis at 14-15.

not to deploy the stated number of satellites in its system or if another NGSO FSS operator were to deploy fewer NGSO satellites than OneWeb says it intends to use, the resulting lower angles and larger beamwidth would likely create challenges in meeting these limits and threaten harmful interference into MVDDS receivers.

## **II. ONEWEB HAS ONCE AGAIN FAILED TO PROVIDE A BUSINESS JUSTIFICATION AS TO WHY IT NEEDS THE 12.2-12.7 GHZ BAND**

The Coalition Petition to Deny is neither an attack on OneWeb, nor an attack on NGSO service generally. To the contrary, it is narrowly tailored to OneWeb's request for access to the 12.2-12.7 GHz band, since that access would do disproportionately more harm (to currently authorized MVDDS services and the 5G potential of the band) than good (to OneWeb). On the benefit side, the Coalition noted that OneWeb has not shown any need for access to this band alongside the 5,900 MHz of other spectrum covered by its application.<sup>11</sup> This showing is especially important when requesting access to such large swaths of spectrum, among them a 500 MHz portion that would preclude any terrestrial use of the band.

How does OneWeb respond to that need for proof? With six lines. It starts by stating that the Coalition's comments are based upon "a lack of understanding about the demand and need for satellite broadband access,"<sup>12</sup> but then does not follow up to explain what this missing understanding is and how it supports its spectrum requirements. Here is the rest of OneWeb's discussion on this topic:

The entire 2 GHz of Ku-band downlink spectrum requested by OneWeb is necessary to provide flexibility to address the various regulatory issues that OneWeb faces in different

---

<sup>11</sup> See Petition to Deny of the MVDDS 5G Coalition, IBFS File No. SAT-LOI-20160428-00041, at 10-13 (Aug. 15, 2016) ("Coalition Petition to Deny").

<sup>12</sup> OneWeb Opposition at 16.

parts of the world, as well as the sharing requirements with other users of the spectrum in the United States.<sup>13</sup>

This is a makeweight rationale. The idea that the U.S. should allow use of the 12.2-12.7 GHz band *in the U.S.* because there may be regulatory issues with other bands *in other countries* does not stand to reason. In such a case, why would the FCC's authorization to use the 12.2-12.7 GHz band in the U.S. be of any help to OneWeb? If France and Uganda did not permit service in other bands, making the 12.2-12.7 GHz band more desirable, the obvious solution would be to request 12.2-12.7 GHz authority from these countries for their territory, not from the Commission for U.S. territory. The second statement fares no better, as it is contradicted by OneWeb's application itself. There, OneWeb stated that in the "unlikely event of a case where the FS interference in the 10.7-11.7 GHz band is problematic" and the 10.7-11.7 GHz cannot be used, "one option may instead be to use mostly the 11.7-12.7 GHz band for service to the user terminal."<sup>14</sup> OneWeb does not, and cannot, explain why these "unlikely events" justify another 500 MHz of spectrum.

In sum, here are just a few of the questions that OneWeb should answer:

- What specific understanding about need for satellite broadband access does the Coalition lack?
- Why and how does such unspecified need for satellite broadband access necessitate that OneWeb be allowed to use the 12.2-12.7 GHz band?
- What regulatory issues around the world require OneWeb to have flexibility to access the 12.2-12.7 GHz band in the U.S.? How would problems with another band in another country be cured by the authority to use more spectrum in the U.S.?

---

<sup>13</sup> *Id.*

<sup>14</sup> WorldVu Satellites Limited, OneWeb Non-Geostationary Satellite System - Technical Information to Supplement Schedule S, at 38 (Apr. 28, 2016) (Attachment A to the OneWeb Petition) ("OneWeb Technical Narrative").



- What is OneWeb’s desired peak and average user data rate and the channel bandwidth needed to achieve these data rates?
- What are the beam and average system-wide throughputs?

Unless and until OneWeb answers these questions, its access to the 12.2-12.7 GHz band would appear to cause only harm and no good. Allowing OneWeb access to the 12.2-12.7 GHz band, and the corresponding damage to MVDDS that such access would entail, cannot be deemed in the public interest.

### **III. ONEWEB’S ENTIRE PLAN HINGES ON MOBILE AND PROPOSES USES NON-COMPLIANT WITH THE COMMISSION’S RULES**

The Commission should evaluate proposals in their entirety.<sup>15</sup> This is especially true when it comes to a component of the proposal that is both integral to the applicant’s plan and, at the same time, the most troubling part of the proposal from the public interest perspective. This is the case with OneWeb’s plan to provide services from its NGSO satellites to mobile terminals. Mobile is the *sine qua non* of its system.

OneWeb’s website exclaims that, “[w]herever you go, your mobile network will follow,” and lauds its LTE and 3G services and its position as an extender of existing mobile networks.<sup>16</sup>

The OneWeb Petition itself also focuses on mobile uses, including by extolling the benefit of

---

<sup>15</sup> Failure to evaluate a critical issue would be inconsistent with reasoned decisionmaking. *See Motor Vehicle Manufacturers Ass’n v. State Farm Mutual Automobile Ins. Co.*, 463 U.S. 29, 43 (1983) (finding that an agency action will ordinarily be arbitrary and capricious if it “entirely failed to consider an important aspect of the problem”); *see also Prometheus Radio Project v. FCC*, 373 F.3d 372, 421 (3d Cir. 2004) (“In repealing the FSSR without any discussion of the effect of its decision on minority television station ownership (and without ever acknowledging the decline in minority station ownership notwithstanding the FSSR), the Commission “entirely failed to consider an important aspect of the problem . . . .”); *Fox TV Stations, Inc. v. FCC*, 280 F.3d 1027, 1050-1051 (D.C. Cir. 2002) (finding the Commission failure to account for three of the four key issues “require that we reverse as arbitrary and capricious the Commission’s decision to retain the CBCO Rule”).

<sup>16</sup> WorldVu Satellites Limited, Solution, <http://oneweb.world/#solution>.

OneWeb’s lightweight user terminals.<sup>17</sup> Indeed, the instances of OneWeb’s emphasis on mobile is plentiful and unavoidable:

- OneWeb’s website advertises and the OneWeb Petition details its use in emergency vehicles;<sup>18</sup>
- OneWeb’s website advertises its use on business jet, commercial and military aviation;<sup>19</sup> and
- The application stresses the “ubiquitous” nature of OneWeb’s service and its intention to allow mobility to wherever is needed.<sup>20</sup>

It is no surprise in light of these examples that the press has referred to OneWeb as a “mobile Internet satellite constellation.”<sup>21</sup>

Yet how does OneWeb respond to the Coalition’s arguments that mobile NGSO use of the band would seal the fate of MVDDS services? With the back of the hand. Here is the entire footnote on the matter:

The Coalition’s additional concerns about the possible use of mobile or transportable Ku-band earth stations in the OneWeb system are inappropriate at this stage of the regulatory process. The potential use of such terminals does not in any way affect the transmissions from the OneWeb satellites, and should be addressed at the stage when OneWeb seeks FCC authorization for the use of such earth stations within the USA. This matter was fully addressed in the FCC’s letter requesting additional information and OneWeb’s response.<sup>22</sup>

The language of the footnote contrasts sharply with the central position of mobile services in OneWeb’s plans, as documented above. But even aside from this inconsistency,

---

<sup>17</sup> See OneWeb Petition at 5-6.

<sup>18</sup> WorldVu Satellites Limited, Use, <http://oneweb.world/#use>; OneWeb Petition at 6.

<sup>19</sup> WorldVu Satellites Limited, Use, <http://oneweb.world/#use>.

<sup>20</sup> OneWeb Petition at 5.

<sup>21</sup> See Mobile firms raised \$4.2B in venture capital globally in January, FierceWireless (Feb. 13, 2015), <http://www.fiercewireless.com/wireless/rutberg-mobile-firms-raised-4-2b-venture-capital-globally-january>.

<sup>22</sup> OneWeb Opposition at 15 n.40 (citations omitted).

every sentence in this footnote is wrong. Consideration of the “possible use of mobile or transportable Ku-band earth stations” is not “inappropriate at this stage,” because “[t]he potential use of such terminals” does in fact directly “affect the transmissions from the OneWeb satellites.” These transmissions qualify as Fixed-Satellite Service if they are made to fixed terminals, and Mobile-Satellite Service if they are made to mobile ones.<sup>23</sup> This means that mobile use should not only be “addressed at the stage when OneWeb seeks FCC authorization for the use of such earth stations within the USA.” Rather, it should be addressed at the stage of this satellite application, since the character of the satellite transmissions is at its center.

Mystifyingly, OneWeb maintains that “[t]his matter was fully addressed in the FCC’s letter requesting additional information and OneWeb’s response.” But the FCC’s letter stated that “applications for the operation of such earth stations may require the filing of appropriate waivers.”<sup>24</sup> In response, OneWeb stated laconically that “OneWeb will address this matter with appropriate waivers at the time it makes applications for earth station licenses,”<sup>25</sup> the position reiterated here. It is, of course, bootstrapping for OneWeb to cite to its own prior position as authority for the correctness of that position.

The Commission is correct in suggesting that a waiver of the Table of Allocations is required to provide service to mobile terminals under a Fixed-Satellite Service allocation. In fact, Iridium had to request a waiver for the opposite – the use of a Mobile-Satellite Service allocation to provide service to fixed terminals, even though fixed service raises fewer sharing

---

<sup>23</sup> The Fixed-Satellite Service (“FSS”) is a “radiocommunication service between earth stations at given positions, when one or more satellites are used,” while the Mobile-Satellite Service (“MSS”) is a “radiocommunication service between mobile earth stations and one or more space stations.” 47 C.F.R. § 25.103.

<sup>24</sup> See Albuquerque Letter at 2.

<sup>25</sup> See Letter from Kalpak Gude, Vice President of Legal-Regulatory, WorldVu Satellites Limited, to Marlene Dortch, Secretary, FCC, at 5 (June 24, 2016).

problems than mobile service, and even though the Iridium MSS license already encompassed the authority to provide service to mobile terminals when they were stationary.<sup>26</sup>

That still-missing waiver request should be submitted and evaluated now. Imagine a world where OneWeb has already received approval to access the U.S. market. Its request for a waiver and authority to use mobile terminals would likely come supported by the argument that access to the U.S. market would become meaningless unless the Commission approves mobile service, too. The Commission should not allow a situation that creates the potential for such pressure, whether explicit or tacit.

#### **IV. THE COALITION'S TECHNICAL ANALYSIS IS CORRECT**

OneWeb's assertion that there is an inconsistency between the Coalition's analysis of the potential for interference into DBS compared to the potential for interference into NGSO FSS operations is similarly misguided.<sup>27</sup> The MVDDS/NGSO Technical Analysis used assumptions *favorable* to OneWeb. A real-world analysis based on OneWeb's actual antenna and receiver performance characteristics (if and when OneWeb ever offers those data) would demonstrate even greater interference than the MVDDS/NGSO Technical Analysis had predicted. Unfortunately, even using assumptions favorable to OneWeb establishes the need for unworkably large separation distances between MVDDS and NGSO FSS operations. In response, OneWeb has not offered so much as a simple back-of-the-envelope analysis to reach a

---

<sup>26</sup> Iridium Constellation LLC Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation, *Order and Authorization*, DA-16-875, ¶ 20 (Aug. 1, 2016). The Commission recognized that it may “grant a waiver of the Table of Frequency Allocations for non-conforming uses of spectrum when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services.” *Id.*

<sup>27</sup> OneWeb Opposition at 15.

contrary conclusion, but instead has tossed together different elements of the technical analysis to suggest absurd results.

***NGSO FSS Signal Strength.*** Given the absence of any meaningful receiver and antenna performance criteria in the OneWeb Petition, the MVDDS/NGSO Technical Analysis calculated the strongest signal strength possible at OneWeb’s receive antenna from its proposed NGSO space stations. OneWeb *benefits* if the signals travelling from its space stations to its earth stations are not subject to as much attenuation as seems likely to occur under real-world conditions because the stronger OneWeb’s signal is at the receive antenna, the less likely OneWeb’s receive antenna will experience harmful interference from co-channel MVDDS operations. The MVDDS/NGSO Technical Analysis therefore assumed that NGSO space stations transmitting to earth would experience no other losses such as clutter or rain attenuation and assumed free space path loss over the shortest possible distance. The Coalition properly calculated the maximum power from the satellite that could be seen on earth based on OneWeb’s stated equivalent isotropically radiated power (“EIRP”) density and satellite altitude.<sup>28</sup> Despite these favorable assumptions for OneWeb, the MVDDS/NGSO Technical Analysis showed that OneWeb’s receive antenna would have little, if any, tolerance for the types of co-channel emissions that MVDDS licensees are authorized to make in the 12.2-12.7 GHz band.

***MVDDS Signal Strength.*** OneWeb also benefits from the assumption in the MVDDS/NGSO Technical Analysis that co-channel MVDDS operations are weaker than seems likely under real-world conditions. In practice, OneWeb’s mobile receive antenna have the

---

<sup>28</sup> In fact, OneWeb used exactly the same calculation in its technical description when determining its maximum satellite PFD. *See* OneWeb Technical Narrative at 20.

capacity to operate anywhere and could be in MVDDS transmitters' line-of-sight.<sup>29</sup> Free space path loss accurately accounts for the absence of any meaningful attenuation beyond theoretical spreading loss in this scenario. Nevertheless, the Coalition recognized that at least some of OneWeb's receive antenna would operate from locations that could benefit from building attenuation and other losses. To ensure the analysis accounted for these types of losses, the MVDDS/NGSO Technical Analysis studied MVDDS signal strength using *both* free space path loss *and* the Longley-Rice methodology, which includes a delta H of 90 meters, to account for variations in terrain.<sup>30</sup> Notwithstanding the generous attenuation afforded under this variant of the Longley-Rice model, the analysis still showed the need for exceptionally large separation distances between OneWeb's receive antenna and co-channel MVDDS operations.

***MVDDS/DBS Sharing.*** OneWeb also attempts to paint the Coalition's previous analysis regarding MVDDS and DBS sharing as exceptional.<sup>31</sup> But that analysis focused on areas with clutter, including urban environments, and represents standard engineering practice among terrestrial radiofrequency engineers for such areas. Terrestrial network-planning studies

---

<sup>29</sup> OneWeb's earth stations are quite different from fixed DBS receive antenna. DBS is a fixed service with extensive self-reporting of the location and operating parameters of receive antenna in the service. OneWeb's proposed system, by contrast, seeks to incorporate extensive mobile operations for a wide variety of as-yet ill-defined use cases.

<sup>30</sup> Employing a delta H of 90 meters will often *overstate* the potential for terrain attenuation between MVDDS transmitters to NGSO earth stations. Many cities, including Indianapolis and Washington, D.C., for example, would not exhibit this much attenuation from ground clutter if values more closely approximating real-world conditions in these cities were used in the analysis. See United States Department of Commerce, *A Guide to the Use of ITS Irregular Terrain Model in the Area Prediction Mode*, NTIA Report No. 82-100 (Apr. 1982), <http://bit.ly/1HsnOj4> (identifying a range of values for  $\Delta H$  based on extensive empirical study and assigning a  $\Delta H$  of 90 meters to hilly terrain – a feature not found in Indianapolis, IN, Washington, DC or many other areas).

<sup>31</sup> See OneWeb Opposition at 15.

typically use the type of pixel-based analysis the MVDDS/DBS coexistence employed.<sup>32</sup> The only real novelty in the MVDDS/DBS Technical Analysis is that the use of LiDAR data provided for greater accuracy in lieu of the somewhat more general geographical information system (“GIS”) information. LiDAR data, which is available to the public, is ideal for the types of close-range analysis required for properly citing the small-cell deployments<sup>33</sup> that grant of the Coalition’s Petition for Rulemaking would permit.<sup>34</sup>

While OneWeb seems to want the Coalition to have performed a LiDAR-based analysis to calculate attenuation of MVDDS transmissions on their path to OneWeb’s earth stations, such an analysis is neither practical nor helpful to OneWeb: OneWeb’s receivers will be mobile (unlike DBS antennas, which are fixed), and are also not constrained to the rooftop locations typical of urban DBS deployments. In any event, the building clutter that the LiDAR data depict would not necessarily obstruct the path between MVDDS transmitters and OneWeb’s NGSO earth stations because OneWeb’s earth station configuration is largely unknown and OneWeb has provided wholly inadequate information about its proposed use cases, customer mix, deployment focus and related factors.<sup>35</sup>

In short, the MVDDS/NGSO Technical Analysis used two different interference attenuation models – free space path loss and Longley-Rice – and applied them in a manner that

---

<sup>32</sup> See, e.g., Asset (Radio Planning), TEOCO, <http://bit.ly/2bUq25U>. A typical pixel-based analysis will vary in resolution depending on the level of accuracy desired or required (e.g., 10 meter, 5 meter, etc.). The MVDDS/NGSO Technical Analysis uses one meter.

<sup>33</sup> See, e.g., Victoria R. Jewell, Use of GIS Radio Frequency Planning and Positioning Applications, at 11 (July 3, 2014) (Thesis, Virginia Polytechnic Institute and State University), <http://bit.ly/2bsb5cS> (explaining that the use of LiDAR data is ideal for providing “more detailed coverage estimates on a smaller scale” because architectural data can be used to improve accuracy in RF indoor positioning).

<sup>34</sup> See Petition of MVDDS 5G Coalition for Rulemaking, RM-11768 (Apr. 26, 2016) (“Coalition Petition for Rulemaking”).

<sup>35</sup> MVDDS/NGSO Technical Analysis at 10.

benefited OneWeb. But even these favorable assumptions were insufficient to overcome the strong likelihood of co-channel interference within reasonable separation distances between MVDDS and NGSO FSS operations.

**V. ONEWEB’S BELATED DISCLOSURE OF A SINGLE RECEIVER PERFORMANCE CHARACTERISTIC IS INADEQUATE AND DOES NOT CHANGE THE RESULTS OF THE MVDDS COALITION’S TECHNICAL ANALYSIS**

The Coalition also properly accounted for antenna isolation.<sup>36</sup> In opposition, OneWeb asserts that its NGSO FSS receive stations will achieve a remarkable 40 dB of isolation from MVDDS transmitters – a level of isolation higher than the front-to-back ratios of many antenna.<sup>37</sup> OneWeb faults the Coalition for “ignoring” these losses, but, in fact, OneWeb never previously disclosed them.<sup>38</sup> In advancing the novel claim that its antenna will achieve 40 dB of isolation, OneWeb may have equated its antenna’s peak performance over some unspecified range of angles with the average antenna performance over all angles.<sup>39</sup> OneWeb does not actually explain how it arrived at its purported 40 dB level of isolation.<sup>40</sup> But the intended form factor of OneWeb’s proposed antenna casts doubt on the feasibility of OneWeb’s performance claims. While 40 dB of receive antenna isolation might be possible if the antenna were large and fixed, OneWeb’s letter of intent and its website indicate that the company intends to deploy

---

<sup>36</sup> MVDDS/NGSO Technical Analysis at 13-15.

<sup>37</sup> OneWeb Opposition at 15.

<sup>38</sup> *Id.* Nowhere in OneWeb’s letter of intent application does the company disclose this 40 dB of isolation figure. *See* OneWeb Petition.

<sup>39</sup> Section 25.209 of the Commission’s rules identifies sidelobe attenuation limits for transmitting earth stations and, by extension, helps establish potential isolation levels for receive antenna. *See* 47 C.F.R § 25.209(a)(2-4). The rule defines antenna gain as an absolute, not a relative, measure; therefore, an operator must normalize the actual peak gain to develop a relative level of rejection.

<sup>40</sup> An abbreviated measurement across some subset of angles is, of course, not the same as a measurement across all applicable angles and will overstate antenna isolation.



small, streamlined receive antennas that would operate in a mobile environment – factors that would almost certainly compromise OneWeb’s antenna performance well below the claimed level of 40 dB.<sup>41</sup>

Even if an isolation of 40 dB represented a realistic performance value for the types of streamlined mobile antennas OneWeb has said it intends to deploy, antenna isolation represents only one characteristic of a complex set of antenna-performance specifications that need to be assessed in their entirety to have any real analytical value. If OneWeb wants the public to use something other than nominal data for its earth stations, OneWeb cannot selectively provide only its preferred antenna-performance characteristics, but rather needs to describe relevant earth station performance criteria to permit more detailed analysis. Questions abound. For instance, do all of OneWeb’s earth stations track satellites in the NGSO FSS constellation? Does OneWeb have multiple receivers and multiple antenna designs or just one? What are the earth stations’ maximum receive antenna gains and antenna patterns? What are the receiver noise figures and minimum carrier-to-noise ratios? And how reliable is orientation to the satellite for each antenna deployed? Offering one antenna-performance trait but not other key characteristics frustrates an informed assessment of OneWeb’s system and the concomitant interference risk from co-channel operations.<sup>42</sup> With the record still devoid of the most basic information about OneWeb’s earth station performance characteristics, the Coalition’s MVDDS/NGSO Technical

---

<sup>41</sup> See generally OneWeb Petition; WorldVu Satellites Limited, Technology, <http://oneweb.world/#technology>.

<sup>42</sup> See, e.g., U.S. Department of Commerce, Sidelobe Gain Characteristics for Ku-Band Earth-Station Antennas, at 1 (1986), <http://bit.ly/2bzlpds> (explaining that when “considering possible interference in the Fixed-Satellite Service caused to another system or experienced from another system,” it is “always is preferable to use actual diagrams from in situ measurements”).

Analysis used reasonable – even conservative – performance characteristics for OneWeb’s system based on commonly used parameters for these frequencies.<sup>43</sup>

## **VI. ONEWEB MISREPRESENTS THE MVDDS COALITION’S STATEMENTS ABOUT THE EFFECT OF NGSO FSS TRANSMITTERS ON MVDDS OPERATIONS IN THE 12.2-12.7 GHZ BAND**

OneWeb falsely claims the Coalition challenged aspects of its application that the Coalition did not. The Coalition did not dispute that if OneWeb implemented and operated its system as proposed, then OneWeb could, in fact, satisfy the applicable PFD limits on NGSO FSS transmitters.<sup>44</sup> At the same time, however, the Coalition stated that if OneWeb did *not* deploy the system as designed, or if another NGSO FSS operator employed fewer NGSO satellites than OneWeb has said it intends to do, satisfying the applicable PFD limits could prove challenging.<sup>45</sup> OneWeb’s claim appears principally intended to distract attention away from a reasoned analysis of OneWeb’s actual performance characteristics as well as the operational challenges that will arise if OneWeb, or another NGSO applicant, were to employ substantially fewer than 720 NGSO satellites.<sup>46</sup>

OneWeb engages in a similar diversionary tactic when it notes that its north-south discrimination is irrelevant to a PFD analysis.<sup>47</sup> OneWeb appears to claim that the Coalition raised concerns about the types of NGSO-to-GSO interference that its unique system architecture has been designed to avoid.<sup>48</sup> The Coalition, however, made no such assertion.

---

<sup>43</sup> See MVDDS/NGSO Technical Analysis at 15.

<sup>44</sup> See *id.* at 17.

<sup>45</sup> *Id.*

<sup>46</sup> See OneWeb Opposition at 16.

<sup>47</sup> *Id.*

<sup>48</sup> *Id.*

OneWeb's claims sidestep the Coalition's actual arguments – namely, that if OneWeb were not to deploy the stated number of satellites in its system or if another NGSO FSS operator were to deploy fewer NGSO satellites than OneWeb says it intends to use, the systems would likely use larger beamwidths, which would likely experience challenges in satisfying the applicable PFD limits for NGSO FSS systems in the 12.2-12.7 GHz band.

## **VII. CONCLUSION**

For these reasons, the Commission should deny the OneWeb Petition for use of the 12.2-12.7 GHz band.

Respectfully submitted,

### **MVDDS 5G Coalition**

#### **Braunston Spectrum LLC**

By: /s/ Tim Davies  
PO Box 783066  
Wichita, KS 67278  
(316) 239-8346

#### **Cass Cable TV, Inc.**

By: /s/ Chad Winters  
100 Redbud Road  
Virginia, IL 62691  
(217) 452-4105

#### **DISH Network L.L.C.**

By: /s/ Alison Minea  
9601 S. Meridian Boulevard  
Englewood, CO 80112  
202-463-3709

#### **GO LONG WIRELESS, LTD.**

By: /s/ Bruce Fox  
4832 Givens Court  
Sarasota, FL 34242  
(941) 349-3500

#### **MVD Number 53 Partners**

By: /s/ A. Wray Fitch III  
6139 Franklin Park Road  
McLean, VA 22101  
(703) 761-5013

#### **Satellite Receivers, Ltd.**

By: /s/ David R. Charles  
1740 Cofrin Drive  
Green Bay, WI 54302  
(920) 432-5777

#### **SOUTH.COM LLC**

By: /s/ Alison Minea  
9601 S. Meridian Boulevard  
Englewood, CO 80112  
202-463-3709

#### **Story Communications, LLC**

By: /s/ Bobby Story  
PO Box 130  
Durant, OK 74702  
(580) 924-2211

**MDS Operations, Inc.**

By: /s/ Kirk Kirkpatrick

729 South Federal Highway, Suite 212

Stuart, FL 34994

(877) 677-6372

**Vision Broadband, LLC**

By: /s/ Patrick McGuinn

145 East 49<sup>th</sup> Street

Hialeah, FL 33013

(202) 255-9011

**WCS Communications, Inc.**

By: /s/ Larry Saunders

3562 Knickerbocker Road

San Angelo, TX 76904

(512) 794-1198

September 1, 2016

## CERTIFICATE OF SERVICE

I, Matthew R. Friedman, hereby certify that on September 1, 2016, I caused true and correct copies of the foregoing to be served by first class mail and electronic mail upon the following:

Kalpak S. Gude  
WorldVu Satellites Limited  
1400 Key Boulevard, Suite A1  
Arlington, VA 22209

Jennifer D. Hindin  
Colleen King  
Wiley Rein LLP  
1776 K Street, NW  
Washington, DC 20006  
Counsel to WorldVu Satellites Limited

Bruce A. Olcott  
Present N. Thomas  
Jones Day  
51 Louisiana Ave. NW  
Washington, DC 20001  
Counsel to the Boeing Company

Audrey L. Allison  
The Boeing Company  
929 Long Bridge Drive  
Arlington, VA 22202

Karis A. Hastings  
SatCom Law LLC  
1317 F Street N.W., Suite 400  
Washington, DC 20004  
Counsel to SES S.A. and O3b Limited

Tim Hughes  
Patricia Cooper  
Space Exploration Technologies Corp.  
1030 15th Street, NW  
Suite 220E  
Washington, DC 20005

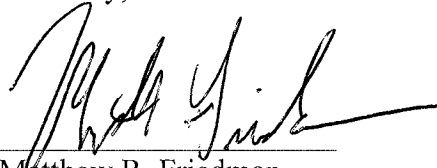
William M. Wiltshire  
Paul Caritj  
Harris, Wiltshire & Grannis LLP  
1919 M Street, NW, Suite 800  
Washington, DC 20036  
Counsel to SpaceX

Elisabeth Neasmith  
Telesat Canada  
1601 Telesat Court  
Ottawa, Ontario  
Canada, K1B 5P4

John P. Janka  
Elizabeth R. Park  
Jarrett S. Taubman  
Latham & Watkins LLP  
555 Eleventh Street, NW, Suite 1000  
Washington, DC 20004  
Counsel to ViaSat, Inc.

Christopher Murphy  
ViaSat, Inc.  
6155 El Camino Real  
Carlsbad, CA 92009

Sincerely,

A handwritten signature in black ink, appearing to read "Matt Friedman", written over a horizontal line.

Matthew R. Friedman  
Stephoe & Johnson LLP