

WorldVu Satellites Limited

1785 Greensboro Station Place, Tower 3
McLean, VA 22102

September 30, 2019

Exhibit A: Narrative Statement

WorldVu Satellites Limited (“OneWeb”) seeks authority from the Federal Communications Commission (the “Commission”) to operate up to 1,500,000 fixed compact electronically steered antenna user terminals (“ESA User Terminals”) under a blanket license to communicate with the OneWeb non-geostationary orbit, fixed-satellite service (“NGSO FSS”) system. In accordance with the terms of OneWeb’s grant of U.S. market access, these ESA User Terminals will operate in the 10.7-12.7 GHz band (downlink) and the 14.0-14.5 GHz band (uplink). Grant of the instant application will serve the public interest, convenience, and necessity. For the reasons set forth herein, OneWeb respectfully requests the expeditious grant of the instant application.

I. Introduction and Overview of Proposed Operations

The OneWeb NGSO FSS system is authorized to access the U.S. market in the 10.7-12.7 GHz and 14.0-14.5 GHz frequencies.¹ OneWeb successfully launched its first six production satellites into low-earth orbit on February 27, 2019, with additional launches planned for later this year.² OneWeb has already sought authority for four Ka-band gateway earth station facilities

¹ See *WorldVu Satellites Limited; Petition for a Declaratory Ruling Granting Access to the U.S. Market for the OneWeb NGSO FSS System*, Order and Declaratory Ruling, 32 FCC Rcd 5366 (2017) (“OneWeb Market Access Grant”). OneWeb also incorporates by reference the OneWeb Market Access grant to demonstrate compliance with the requirements of Section 25.137 of the Commission’s rules for earth station applicants proposing to communicate with non-U.S.-licensed space stations. In addition, OneWeb certifies that it has complied with all applicable Commission requirements for non-U.S.-licensed systems to operate in the United States. See 47 C.F.R. § 25.137(a), (d).

² See, e.g., Jackie Wattles, *OneWeb Launches First Batch of Internet Satellites*, CNN (Feb. 28, 2019, 7:02 PM), <https://www.cnn.com/2019/02/27/tech/oneweb-internet-satellite-launch/index.html>.

located in the United States,³ and recently inaugurated a state-of-the-art satellite manufacturing facility in Florida that, in the words of Chairman Pai, promises to “do for the satellite industry what Henry Ford did for cars.”⁴

Authorization to operate the ESA User Terminals across the United States represents a critical step forward in OneWeb’s operational deployment. OneWeb’s provision of high-speed, low-latency satellite connectivity through the ESA User Terminals is crucial to bringing the benefits of this innovative connectivity to the U.S. consumer. Commission authorization of the ESA User Terminals is essential to OneWeb’s efforts to expedite the deployment of its satellite-based connectivity service to the benefit of those U.S. consumers who currently have no or limited access to broadband due to the lack of terrestrial networks in rural and remote locations.

II. Compatibility with Existing Ku-band Allocations and Spectrum Sharing Regulations

The 10.7-12.7 and 14.0-14.5 GHz bands are allocated to the FSS on a primary or co-primary basis, and the Commission’s rules permit blanket licensing of NGSO FSS earth stations in these bands.⁵ OneWeb’s Market Access Grant permits OneWeb to access these frequencies subject to certain conditions.⁶ As a general matter, OneWeb will operate the ESA User

³ See IBFS File Nos. SES-LIC-20180604-01082 (filed Jun. 4, 2018); SES-LIC-20180727-02075 (filed Jul. 27, 2018); SES-LIC-20180727-02076 (filed Jul. 27, 2018); SES-LIC-20190422-00538 (filed Apr. 22, 2019).

⁴ See Jeff Foust, *OneWeb Satellites inaugurates Florida factory*, SPACENEWS (Jul. 22, 2019), <https://spacenews.com/oneweb-satellites-inaugurates-florida-factory/>; see also *Remarks of Chairman Pai at the Opening of OneWeb Satellites’ Production Facility*, FCC (Jul. 22, 2019), <https://docs.fcc.gov/public/attachments/DOC-358604A1.pdf>.

⁵ See 47 C.F.R. § 25.106; see also 47 C.F.R. § 25.115(f)(2).

⁶ OneWeb Market Access Grant at ¶¶ 23(a)-(e); 24(a)-(b).

Terminals in a manner consistent with these current allocations and regulations concerning Ku-band earth stations in the Ku-band. In particular, OneWeb certifies or has already certified it will comply with the following restrictions:

- ***Equivalent Power Flux-Density Requirements (“EPFD”)***. To protect geostationary satellite operations in these bands, OneWeb has already certified it will satisfy all applicable obligations under Article 22 and Resolution 76 of the International Telecommunication Union’s (“ITU”) Radio Regulations, currently codified by reference in the Commission’s rules.⁷ As the Commission has noted, “[a]ny NGSO FSS system operating in compliance with these limits is considered as having fulfilled its obligation under Article 22 of the ITU Radio Regulations not to cause unacceptable interference to any GSO network.”⁸
- ***Power-Flux Density Requirements (“PFD”)***. OneWeb has certified it will satisfy all applicable obligations under Article 21 of the ITU Radio Regulations and the corresponding PFD limits set forth in Section 25.208 of the Commission’s rules in these bands.⁹
- ***Coordination with Radio Astronomy Service***. OneWeb will also coordinate with the radio astronomy service and observatories, where applicable, prior to commencing operations.¹⁰

⁷ See *id.* at ¶ 23(b)-(e); see also 47 C.F.R. §§ 25.115(f)(1), 25.146(a)(2) (requiring NGSO FSS earth station applications to contain the required certification regarding EPFD compliance). To clarify the slight discrepancy between the relevant conditions on the OneWeb Market Access Grant and the Commission’s EPFD certification requirement, OneWeb respectfully submitted an EPFD and PFD certification letter earlier this year. See Letter from Brian D. Weimer, Counsel to WorldVu Satellites Limited, to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-LOI-20160428-00041 (Mar. 14, 2019) (“EPFD/PFD Certification Letter”).

⁸ See *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809, 7820 at ¶ 32 (2017) (“NGSO Order”).

⁹ See EPFD/PFD Certification Letter.

¹⁰ See 47 C.F.R. § 2.106, nn. US113, US131, US211, US342; see also OneWeb Market Access Grant at ¶ 24 (a)-(b).

OneWeb will otherwise comply with the applicable conditions contained in the OneWeb Market Access Grant and the Commission’s Part 25 rules.¹¹

III. Grant of the Instant Application Will Serve the Public Interest

Grant of the instant application will authorize deployment of the end-user component of the OneWeb system and expedite deployment of OneWeb’s satellite connectivity service to the benefit of U.S. consumers. OneWeb received U.S. market access in June 2017 and began applying for Ka-band gateway earth stations in 2018.¹² Obtaining authority for ESA User Terminal operations is the critical next step as OneWeb prepares to commence commercial service in the United States and abroad.

In the OneWeb Market Access Grant, the Commission noted that by granting market access to OneWeb, it was “advanc[ing] [its] mandate ‘to make available, so far as possible, to all the people of the United States . . . rapid, efficient, Nation-wide, and world-wide’ communication services.”¹³ By granting OneWeb authority to operate ESA User Terminals in the United States, the Commission will unlock the ability of the OneWeb system to provide next-generation connectivity service to U.S. consumers on a nationwide basis, including many unserved and underserved locations.

Granting OneWeb authority to operate the ESA User Terminals in the United States is consistent with the Commission’s “fundamental approach: [to] encourage the private sector to

¹¹ See OneWeb Market Access Grant, ¶¶ 23-25. Additionally, OneWeb hereby certifies that it is planning to use a contention protocol, and such contention protocol usage will be reasonable. See 47 C.F.R. § 25.115(i).

¹² See *supra* nn. 1, 3.

¹³ OneWeb Market Access Grant, at ¶ 1.

invest and innovate and allow market forces to deliver value to American consumers.”¹⁴ As

OneWeb has emphasized and the Commission has recognized, NGSO-provisioned connectivity will be a critical component of efforts to bridge the digital divide in the United States.¹⁵

OneWeb in particular will be able to provide innovative services and applications to markets that previously were not possible.¹⁶ The expeditious grant of the instant application will allow

OneWeb to move forward on the path to transforming satellite connectivity in the United States.

¹⁴ See *Statement of Chairman Ajit Pai, FCC Boosts Satellite Broadband Connectivity & Competition*, FCC (Nov. 15, 2018).

¹⁵ See Jeffrey Hill, *FCC Chairman Wants to Cultivate Innovation in Space*, VIA SATELLITE (Feb. 2019), <https://www.satellitetoday.com/government-military/2019/01/22/fcc-chairman-wants-to-cultivate-innovation-in-space/> (Chairman Pai stating he is “bullish” about satellite systems being the best solution to bridging the digital divide in the United States).

¹⁶ See Mark Holmes, *Greg Wyler, The Definitive 2018 Interview*, VIA SATELLITE (Dec. 2018), <http://interactive.satellitetoday.com/via/december-2018/greg-wyler-the-definitive-2018-interview/> (OneWeb will work to ensure that “emergency response vehicles are outfitted appropriately so that they can maintain continuous, low latency connectivity” that “can continue after a hurricane and an emergency.”).

IV. Conclusion

For the foregoing reasons, OneWeb respectfully requests authority to operate the ESA User Terminals in the United States.

Respectfully submitted,

/s/ Eric Graham
Eric Graham
Regulatory Affairs, North America
WorldVu Satellites Limited
1785 Greensboro Station Place, Tower 3
McLean, VA 22102

Brian Weimer
Douglas Svor
Samuel Swoyer
Sheppard Mullin Richter & Hampton LLP
2099 Pennsylvania Ave NW, Suite 100
Washington, DC 20006
(202) 747-1930
bweimer@sheppardmullin.com

Counsel to WorldVu Satellites Limited

September 30, 2019

APPENDIX A

As a supplement to the information contained in the Schedule B attached to the Form 312, OneWeb provides the following additional technical information:

- For entry cell E49, the appropriate input unit is dBW/4 kHz.

APPENDIX B: RADIATION HAZARD REPORT

In accordance with OET Bulletin 65, this Radiation Hazard Report measured radiation exposure levels in seven zones for two cases—general population and occupational—at the closest point to the uncontrolled area of any testing location and measured at the lowest elevation angle of any testing location. The radiation levels calculated for each zone in Section B are derived from the calculations made in Section A. The results in Section C for OneWeb’s ESA User Terminal illustrate any radiation hazard that may exist for the general public and/or occupationally will be mitigated by limited access and various protocols to ensure safe exposure levels.

I. OneWeb Compact-ESA

A. Defined & Calculated Variables for OET Bulletin 65

Variables	Value	Unit	OET 65 Calculated Variables	Formula	Value	Unit
$D =$ Aperture Diameter	0.46	Meters	$\lambda =$ Wavelength	c/F	0.0210	Meters
$d =$ Subreflector Diameter	0	Meters	$P_1 =$ Total Antenna Input Power	$P * p$	2.2	Watts
$\eta =$ Aperture Efficiency	70%	Percentage	$A =$ Area of reflector	$\pi(D/2)^2$	0.16619	Meters ²
FCC Designation	Ku	Band	$a =$ area of sub-reflector	$\pi(d/2)^2$	0	Meters ²
$F =$ Frequency	14250	MHz	$G =$ Antenna Gain	$G =$ $4\pi\eta A/\lambda^2$	3302.948268	Linear
$P =$ Transmitter Power Watts	2.2	Watts	Antenna Gain dB	$10\log_{10}(G)$	35.2	dBi
$p =$ Number of Transmitters	1	#	$R_{nf} =$ Near-Field Region	$R_{nf} = D^2/4\lambda$	2.51	Meters
$R_{ua} =$ Closest Point to Uncontrolled Area	0.05	Meters	Transition Region	$>R_{nf} < R_{ff}$	2.51	>Meters
$R_{ua} =$ Elevation angle at closest point	37	Degrees			6.03	<Meters
					6.03	Meters
			$R_{ff} =$ Far-Field Region	$R_{ff} =$ $0.6D^2/\lambda$	4.54	Meters AGL

B. Radiation Levels in Each Zone

Radiation Analysis Zone		Formula	Level	Value	Exposure Limits Met	
					General Public	Occupational
					<1mW/cm ²	<5mW/cm ²
1	Power Sub-reflector	$4P_I/a$	N/A	mW/cm ²	Yes	Yes
2	Antenna Surface	$4P_I/A$	5.295	mW/cm ²	No	No
3	Main Reflector Ground	P_I/A	1.324	mW/cm ²	No	Yes
4	$S_{nf} =$ Near-Field Power Density	$4\eta(P_I/A)$	3.707	mW/cm ²	No	Yes
5	Transition Max Power Density	$S_{nf}*R_{nf}/R_{nf}$	3.707	mW/cm ²	No	Yes
6	Far-Field Max Power Density	$P_I*G/4\pi R^2$	1.588	mW/cm ²	No	Yes
7	Off-axis Near Field	Snf-20dB	0.03707	mW/cm ²	Yes	Yes

C. Results

OneWeb's ESA creates no general population nor occupational radiation hazard. Zone 1 is of no concern because the OneWeb ESA contains no power sub-reflector, and Zone 7 is below the acceptable exposure limits. Although Zones 2 through 5 exceed the acceptable general population radiation exposure limits, there remains no radiation hazard concern to the general public because the OneWeb ESA User Terminal will be installed with authorized personnel only signage in restricted areas such as on rooftops and behind fencing. Zone 6 also creates no concern to the general public because it develops 6.03 meters above whatever surface level the OneWeb ESA User Terminal is installed. With regards to Zone 2 also exceeding the acceptable occupational limit, authorized service personnel are trained to turn off the OneWeb ESA User Terminal when servicing in very close proximity to the antenna. Accordingly, there is no risk of radiation exposure beyond the acceptable limits.

APPENDIX C: ANTENNA PERFORMANCE STANDARDS

OneWeb respectfully submits that the Commission’s antenna performance standards contained in Section 25.209 of the Commission’s rules are not applicable to NGSO user terminals.¹⁷ Section 25.209 currently contains performance standards for gateway earth stations in the Ku-band, but no such corresponding provision for user terminals.¹⁸

In developing the original regulatory framework for NGSO FSS systems, the Commission explicitly declined to “specify an NGSO FSS customer premises earth station reference antenna pattern.”¹⁹ The recent *NGSO Order* similarly declined to adopt any antenna performance standard for NGSO user terminals, noting that it was “premature to adopt any additional technical limitations to promote sharing among NGSO FSS systems.”²⁰

Accordingly, the antenna performance standard currently contained in the Commission’s rules are inapplicable to OneWeb’s request for authority to operate the User Terminals in the United States.²¹

¹⁷ See 47 C.F.R. § 25.209.

¹⁸ See *id.* at § 25.209(h) (specifying performance standards for Ku-band gateway antennas). As a result, the requirements in Section 25.132 requiring FSS applications to include certifications of the results of a series of radiation pattern tests is similarly inapplicable. See 47 C.F.R. § 25.132(a)(1).

¹⁹ *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*, 16 FCC Rcd. 4096, 4187 at ¶ 240 (2000)

²⁰ NGSO Order, at ¶ 55.

²¹ OneWeb notes that other NGSO FSS applicants have taken a similar approach when seeking authority for Ku-band user terminals in the United States. See, e.g., *SpaceX Services, Application for Blanket Licensed Earth Stations*, IBFS File No. SES-LIC-20190211-00151 (filed Feb. 1, 2019).