
OneWeb

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Exhibit A: Narrative Statement

WorldVu Satellites Limited (“OneWeb”) seeks authority from the Federal Communications Commission (the “Commission”) to operate earth stations on vessels (“ESV”) under a blanket license to communicate with the OneWeb non-geostationary orbit (“NGSO”), fixed-satellite service (“FSS”) system (the “OneWeb System”). In accordance with the terms of OneWeb’s grant of U.S. market access, these ESVs 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 ESV Operations

The OneWeb System is authorized to access the U.S. market in the 10.7-12.7 GHz and 14.0-14.5 GHz frequencies.¹ Through this application, OneWeb seeks to operate ESVs of both its single and dual parabolic maritime user terminal earth station antennas in the territorial waters of the United States and aboard US-registered vessels throughout international waters worldwide. These ESVs have a gimbal that stabilizes the antenna to adjust the pitch, roll, and yaw of the antenna to accommodate movement of the vessel and maintain accurate pointing towards the OneWeb satellite serving the antenna, and a primary/primary configuration to help manage blockage mitigation.² Additionally, OneWeb is requesting a slightly higher Effective

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 This primary/primary configuration enables each antenna to connect independently to the OneWeb system, but only one of them at a time is used as the active path to carry user traffic.

Isotropic Radiated Power ("EIRP") level for the single parabolic maritime antenna as requested in the fixed single parabolic modification application.³ Aside from these additional features, the ESVs are technically identical to the respective dual and single parabolic antenna already licensed by the Commission.⁴

Authorization to deploy these ESVs will further enable the most efficient provision of OneWeb's high-speed, low-latency satellite connectivity service to the U.S. consumers aboard vessels in the territorial waters of the United States and aboard U.S.-registered vessels throughout international waters worldwide.

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

a. 10.7-12.2 and 14.0-14.5 GHz

The 10.7-12.2 and 14.0-14.5 GHz bands are designated for use by NGSO FSS Earth Stations in Motion ("ESIM") operations.⁵ OneWeb's Market Access Grant permits OneWeb to access these frequencies subject to certain conditions.⁶ OneWeb will operate the ESVs in a manner consistent with the current allocations and regulations concerning Ku-band earth stations. In particular, OneWeb certifies or already has certified it will comply with the following restrictions:

³ See *WorldVu Satellites Limited, Modification Application to Increase EIRP for Single Parabolic Terminal*, SES-MOD-20230317-00463 (Mar. 15, 2023).

⁴ See *WorldVu Satellites Limited, Radio Station Authorization for Dual Parabolic Terminals*, SES-LIC-20190930-01237 (Apr. 29, 2021); *WorldVu Satellites Limited, Radio Station Authorization for Single Parabolic Terminal*, SES-LIC-20220801-00883 (Dec. 19, 2022).

⁵ See 47 C.F.R. § 25.202(a)(10)(ii) (noting the term "earth stations in motion" collectively includes both ESVs and earth stations aboard aircraft).

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

- 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 National Science Foundation (“NSF”) regarding protection of the radio astronomy observatories in 10.6-10.7 GHz and 14.47-14.5 GHz, where applicable.¹⁰
- OneWeb certifies that operation of its ESVs in the 14.0-14.2 GHz band within 125 km of the specified NASA TDRSS facilities will be coordinated and not exceed an EIRP spectral density towards the horizon of 12.5 dBW/MHz and will not exceed an EIRP towards the horizon of 16.3 dBW.¹¹
- OneWeb’s ESVs will utilize Global Positioning Satellite (“GPS”) technology.¹²

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. 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); 25.228(j)(3).

¹¹ See 47 C.F.R. § 25.228(j)(1)-(2).

¹² *Id.* § 25.228(j)(5).

OneWeb will otherwise comply with the applicable conditions contained in the OneWeb Market Access Grant and the Commission’s Part 25 rules.¹³

b. 12.2-12.7 GHz

Although NGSO FSS ESIM operations are not expressly permitted in the 12.2-12.7 GHz frequency band (“12 GHz band”), the Commission has recently approved NGSO FSS ESIM operations in this band on a non-interference basis.¹⁴ Pursuant to 25.202(b) of the Commission’s rules, it may permit operations in additional frequencies on a case-by-case basis, without the applicant requesting a waiver. OneWeb requests permission to operate its ESVs in the 12 GHz band similar to those operators already approved and will also do so on a non-interference basis. OneWeb notes that the certifications discussed above are also applicable to its use of the 12 GHz band.¹⁵ As discussed in the section below, permission to operate these ESVs in all the requested frequency bands, including the 12 GHz band, will serve the public interest.

III. Operation of the OneWeb ESVs

Section 25.228 of the Commission’s rules sets forth several operational requirements for ESIMs. OneWeb’s ESVs are self-monitoring and in the event a condition occurs that would cause the ESVs to exceed any emission limits included in OneWeb’s licensing conditions, the ESV will automatically cease transmissions within 100 milliseconds and not resume

¹³ 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).

¹⁴ See *SpaceX Services, Inc. & Kepler Communications Inc., Applications for Blanket Authorization of ESIMs*, Order and Authorization, DA 22-695 (June 30, 2022) (“NGSO Operator ESIM Authorization”).

¹⁵ With the Commission’s approval of NGSO FSS ESIM operations in these band, paragraph 8 of the OneWeb Market Access Grant has been superseded regarding the Multichannel Video Distribution and Data Service (“MVDDS”); See *OneWeb Market Access Grant* at 8.

transmissions until the condition that caused the ESV to exceed those limits is corrected.¹⁶ All ESVs will be monitored and controlled by OneWeb's Ground Network Operations Center ("GNOC"), which is capable of issuing "disable transmission" commands that the ESV will comply withing 100 milliseconds.¹⁷ The GNOC will issue these commands should a situation arise in which the ESV is exceeding the licensed conditions.¹⁸

OneWeb certifies that installation of the ESV terminals on vessels will be completed by qualified installers who have an understanding of the antenna's radiation environment and the measures best suited to maximize protection of the general public and persons operating the vehicle and equipment.¹⁹ Additionally, OneWeb will ensure an ESV terminal exhibiting radiation exposure levels exceeding 1.0 mW/cm² in accessible areas, such as at the exterior surface of the radome, will have a label attached to the surface of the terminal warning about the radiation hazard and will include thereon a diagram showing the regions around the terminal where the radiation levels could exceed the maximum radiation exposure limit specified in 47 CFR 1.1310 Table 1.²⁰

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

OneWeb is readying itself to enter another market to serve with its next-generation connectivity service. By granting OneWeb authority to operate these ESVs in the requested frequencies in the United States, the Commission will strengthen the ability of the OneWeb system to provide next-generation connectivity service to U.S. consumers not just on land, but

¹⁶ 25.228(b).

¹⁷ 25.228(c).

¹⁸ *Id.*

¹⁹ 47 C.F.R. 25.228(d).

²⁰ *Id.*

aboard vessels in the territorial waters of the United States and aboard U.S.-registered vessels throughout international waters worldwide.

As OneWeb has emphasized and the Commission has recognized, NGSO-provisioned connectivity will be a critical component of efforts to meeting growing demands for user connectivity, with specific reference to “much-needed connectivity to vessels.”²¹ With the two variants of user terminals requested herein, OneWeb will further be able to meet that growing demand in the maritime markets.

²¹ NGSO Operator ESIM Authorization, 13.

APPENDIX 1: 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 zones in Sections B below are derived from the respective calculations made in Section A. The results in Sections C illustrate any radiation hazard that may exist for the general public and/or occupationally.

I. Intellian OW50M Single Parabolic Maritime Antenna

A. Defined & Calculated Variables for OET Bulletin 65

Variables	Value	Unit	OET 65 Calculated Variables	Formula	Value	Unit
$D =$ <i>Aperture Diameter</i>	0.53	Meters	$\lambda =$ Wavelength	c/F	0.0210	Meters
$d =$ <i>Subreflector Diameter</i>	0.085	Meters	$P_1 =$ Total Antenna Input Power	$P \cdot p$	1	Watts
$\eta =$ <i>Aperture Efficiency</i>	49%	Percentage	$A =$ Area of reflector	$\pi(D/2)^2$	0.22062	Meters ²
FCC <i>Designation</i>	Ku	Band	$a =$ area of sub-reflector	$\pi(d/2)^2$	0.00567	Meters ²
$F =$ <i>Frequency</i>	14250	MHz	$G =$ Antenna Gain	$G =$ $4\pi\eta A/\lambda^2$	3088.067087	Linear
$P =$ <i>Transmitter Power Watts</i>	1.5	Watts	Antenna Gain dB	$10\log_{10}(G)$	34.90	dBi
$p =$ <i>Number of Transmitters</i>	1	#	$R_{nf} =$ Near-Field Region	$R_{nf} =$ $D^2/4\lambda$	3.34	Meters
$R_{ua} =$ <i>Closest Point to Uncontrolled Area</i>	0.38	Meters	Transition Region	$>R_{nf} < R_{ff}$	3.34	>Meters
$R_{ua} =$ <i>Elevation angle at closest point</i>	37	Degrees			8.01	<Meters
						8.01
			$R_{ff} =$ Far-Field Region	$R_{ff} =$ $0.6D^2/\lambda$	6.04	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	104.263	mW/cm ²	No	No
2	Antenna Surface	4P _I /A	2.682	mW/cm ²	No	Yes
3	Main Reflector Ground	P _I /A	0.670	mW/cm ²	Yes	Yes
4	S _{nf} = Near-Field Power Density	4η(P _I /A)	1.322	mW/cm ²	No	Yes
5	Transition Max Power Density	S _{nf} *R _{nf} /R _{nf}	1.322	mW/cm ²	No	Yes
6	Far-Field Max Power Density	P _I *G/4πR ²	0.566	mW/cm ²	Yes	Yes
7	Off-axis Near Field	S _{nf} -20dB	0.01322	mW/cm ²	Yes	Yes

C. Results

OneWeb's OW50M Single Parabolic Maritime Antenna passes Zones 3, 6, and 7. Although Zone 1 (Power Sub-reflector) exceeds the acceptable general population and occupational radiation exposure limits and Zone 2 (Antenna Surface) exceeds the acceptable general population radiation exposure limits, there remains no radiation hazard concern because these zones are contained within a protective radome. Any maintenance on the antenna will be completed with the antenna powered off, and only powered back on when the radome is replaced. Where the antenna fails in Zones 4 and 5 for the general population, OneWeb notes that the general population will not have access to the antenna or where it is typically installed in a controlled access portion of a larger vessel. In any event, OneWeb will ensure the following mitigation actions are in place:²²

- Blue signage with the signal word "NOTICE" and appropriate exposure limit information
- Appropriate training for any occupational personnel with access to the controlled area

II. Intellian OW70M Dual Parabolic Maritime Antenna

A. Defined & Calculated Variables for OET Bulletin 65

²² See Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields, Resolution of Notice of Inquiry, Second Report and Order, Notice of Proposed Rulemaking, and Memorandum Opinion Order, FCC 19-126 (Dec. 4, 2019).

Variables	Value	Unit	OET 65 Calculated Variables	Formula	Value	Unit
$D =$ <i>Aperture Diameter</i>	0.7	Meters	$\lambda =$ Wavelength	c/F	0.0210	Meters
$d =$ <i>Subreflector Diameter</i>	0.085	Meters	$P_1 =$ Total Antenna Input Power	$P \cdot p$	1	Watts
$\eta =$ <i>Aperture Efficiency</i>	55%	Percentage	$A =$ Area of reflector	$\pi(D/2)^2$	0.38485	Meters ²
FCC <i>Designation</i>	Ku	Band	$a =$ area of sub-reflector	$\pi(d/2)^2$	0.00567	Meters ²
$F =$ <i>Frequency</i>	14250	MHz	$G =$ Antenna Gain	$G =$ $4\pi\eta A/\lambda^2$	6020.544172	Linear
$P =$ <i>Transmitter Power Watts</i>	1.2	Watts	Antenna Gain dB	$10\log_{10}(G)$	37.80	dBi
$p =$ <i>Number of Transmitters</i>	1	#	$R_{nf} =$ Near-Field Region	$R_{nf} =$ $D^2/4\lambda$	5.82	Meters
$R_{ua} =$ <i>Closest Point to Uncontrolled Area</i>	0.38	Meters	Transition Region	$>R_{nf} < R_{ff}$	5.82	>Meters
$R_{ua} =$ <i>Elevation angle at closest point</i>	37	Degrees			13.97	<Meters
						13.97
			$R_{ff} =$ Far-Field Region	$R_{ff} =$ $0.6D^2/\lambda$	10.53	Meters AGL

B. Radiation Levels in Each Zone

Radiation Analysis Zone					Exposure Limits Met	
					General Public	Occupational
					<1mW/cm ²	<5mW/cm ²
1	Power Sub-reflector	$4P_1/a$	85.294	mW/cm ²	No	No
2	Antenna Surface	$4P_1/A$	1.258	mW/cm ²	No	Yes
3	Main Reflector Ground	P_1/A	0.314	mW/cm ²	Yes	Yes
4	$S_{nf} =$	$4\eta(P_1/A)$	0.693	mW/cm ²	Yes	Yes

	Near-Field Power Density					
5	Transition Max Power Density	$S_{nf} * R_{nf} / R_{nf}$	0.693	mW/cm ²	Yes	Yes
6	Far-Field Max Power Density	$P_t * G / 4\pi R^2$	0.297	mW/cm ²	Yes	Yes
7	Off-axis Near Field	Snf-20dB	0.00693	mW/cm ²	Yes	Yes

C. Results

OneWeb's OW70M Dual Parabolic Maritime Antenna creates no general population nor occupational radiation hazard. Zones 3 through 7 create no radiation hazard concerns because the radiation levels are below the acceptable exposure limits. Although Zones 1 (Power Sub-reflector) and 2 (Antenna Surface) exceeds the acceptable general population and occupational radiation exposure limits there remains no radiation hazard concern because these zones are contained within a protective radome. As indicated above, any maintenance on the antenna will be completed with the antenna powered off, and only powered back on when the radome is replaced. Accordingly, there is no risk of radiation exposure beyond the acceptable limits.