APPENDIX A

RADIATION HAZARD REPORT: INTELLIAN 12 dB/K DUAL PARABOLIC ANTENNA

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 II are derived from the calculations made in Section I. The results in Section III for OneWeb's 12 dB/K Dual Parabolic antenna illustrate any radiation hazard that may exist for the general public and/or occupationally will be mitigated by a protective layer covering the antenna.

I. Defined Variables for OET Bulletin 65 Calculated Variables

Variables	Value	Unit	*OET 65 Calculated Variables*	Formula	Value	Unit
D = *Aperture Diameter*	0.75	Meters	λ = Wavelength	c/F	0.0210	Meters
d = *Subreflector Diameter*	0.085	Meters	P_I = Total Antenna Input Power	P*p	1.15	Watts
η = *Aperture Efficiency*	70%	Percentage	A = Area of reflector	$\pi(D/2)^2$	0.44179	$Meters^2$
FCC Designation	Ku	Band	a = area of sub-reflector	$\pi(d/2)^2$	0.00567	$Meters^2$
F = *Frequency*	14250	MHz	G = Antenna Gain	$G = 4\pi\eta A/\lambda^2$	8780.28545	Linear
P = *Transmitter Power Watts*	1.15	Watts	Antenna Gain dB	$10\log_{10}(G)$	39.44	dBi
p = *Number of Transmitters*	1	#	R_{nf} = Near-Field Region	$R_{nf} = D^2/4\lambda$	6.68	Meters
R_{ua} = *Closest Point to Uncontrolled Area*	0.38	Meters	Transition Region	$>R_{nf} <R_{ff}$	6.68	>Meters
R_{ua} = *Elevation angle at closest point*	30	Degrees			16.04	<Meters
			R_{ff} = Far-Field Region	$R_{ff} = 0.6D^2/\lambda$	16.04	Meters
					9.2	Meters AGL

II. 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	$4P_I/a$	81.064	mW/cm^2	No	No
2	Antenna Surface	$4P_I/A$	1.041	mW/cm^2	No	Yes
3	Main Reflector Ground	P_I/A	0.260	mW/cm^2	Yes	Yes
4	S_{nf} = Near-Field Power Density	$4\eta(P_I/A)$	0.729	mW/cm^2	Yes	Yes
5	Transition Max Power Density	$S_{nf}*R_{nf}/R_{nf}$	0.729	mW/cm^2	Yes	Yes
6	Far-Field Max Power Density	$P_I*G/4\pi R^2$	0.312	mW/cm^2	Yes	Yes
7	Off-axis Near Field	Snf-20dB	0.00729	mW/cm^2	Yes	Yes

III. Results

OneWeb's 12 dB/K Dual Parabolic 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 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 is no radiation hazard concern because these zones are contained within a protective radome. Accordingly, there is no risk of radiation exposure beyond the acceptable limits.

APPENDIX B

RADIATION HAZARD REPORT: 15 dB/K DUAL PARABOLIC ANTENNA

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 II are derived from the calculations made in Section I. The results in Section III for OneWeb's 15 dB/K Dual Parabolic antenna illustrate any radiation hazard that may exist for the general public and/or occupationally will be mitigated by a protective layer covering the antenna.

I. Defined Variables for OET Bulletin 65 Calculated Variables

Variables	Value	Unit	*OET 65 Calculated Variables*	Formula	Value	Unit
D = Aperture Diameter	1.0	Meters	λ = Wavelength	c/F	0.0210	Meters
d = Subreflector Diameter	0.085	Meters	P_I = Total Antenna Input Power	P*p	0.58	Watts
η = Aperture Efficiency	70%	Percentage	A = Area of reflector	$\pi(D/2)^2$	0.78540	$Meters^2$
FCC Designation	Ku	Band	a = area of sub-reflector	$\pi(d/2)^2$	0.00567	$Meters^2$
F = Frequency	14250	MHz	G = Antenna Gain	$G = 4\pi\eta A/\lambda^2$	15609.3963	Linear
P = Transmitter Power Watts	0.58	Watts	Antenna Gain dB	$10\log_{10}(G)$	41.93	dBi
p = Number of Transmitters	1	#	R_{nf} = Near-Field Region	$R_{nf} = D^2/4\lambda$	11.88	Meters
R_{ua} = Closest Point to Uncontrolled Area	0.52	Meters	Transition Region	$>R_{nf} <R_{ff}$	11.88	>Meters
R_{ua} = Elevation angle at closest point	30	Degrees			28.52	<Meters
			R_{ff} = Far-Field Region	$R_{ff} = 0.6D^2/\lambda$	28.52	Meters
					16.5	Meters AGL

II. 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	$4P_I/a$	40.885	mW/cm^2	No	No
2	Antenna Surface	$4P_I/A$	0.295	mW/cm^2	Yes	Yes
3	Main Reflector Ground	P_I/A	0.074	mW/cm^2	Yes	Yes
4	S_{nf} = Near-Field Power Density	$4\eta(P_I/A)$	0.207	mW/cm^2	Yes	Yes
5	Transition Max Power Density	$S_{nf}*R_{nf}/R_{nf}$	0.207	mW/cm^2	Yes	Yes
6	Far-Field Max Power Density	$P_I*G/4\pi R^2$	0.089	mW/cm^2	Yes	Yes
7	Off-axis Near Field	Snf-20dB	0.00207	mW/cm^2	Yes	Yes

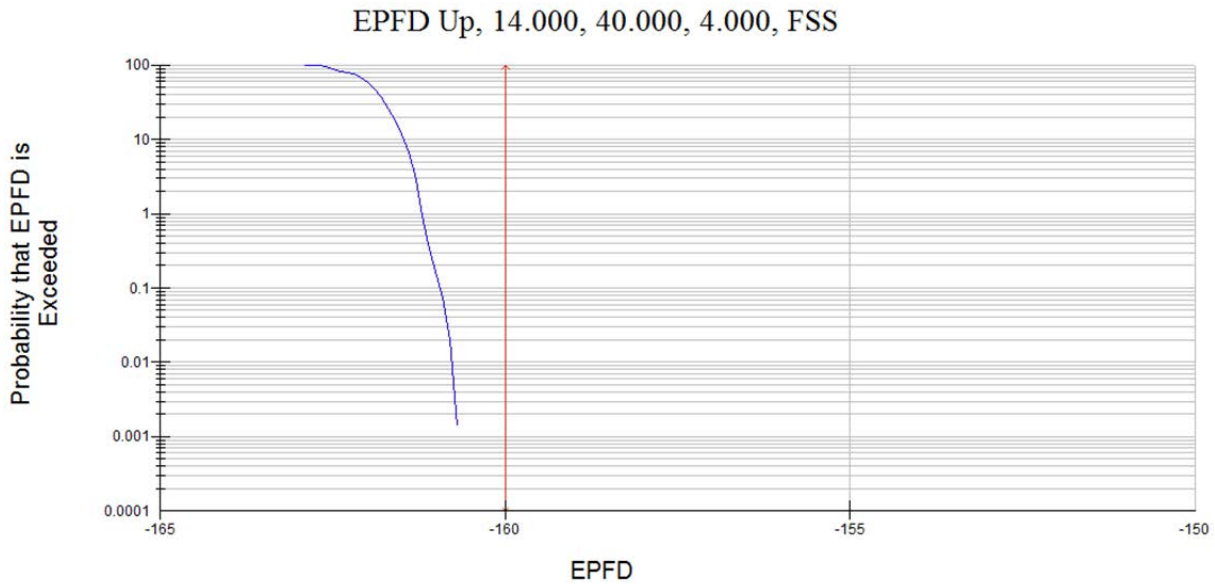
III. Results

OneWeb's 15 dB/K Dual Parabolic antenna creates no general population nor occupational radiation hazard. Zones 2 through 7 create no radiation hazard concerns because the radiation levels are below the acceptable exposure limits. Although Zone 1—Power Sub-reflector—exceeds the acceptable general population and occupational radiation exposure limits, there is no radiation hazard concern because this zone is contained within a protective radome. Accordingly, there is no risk of radiation exposure beyond the acceptable limits.

APPENDIX C

The Ku-band EPFDup results from the EPFD validation computer program using the input data explained above are shown below. The labeling of the diagram indicates the frequency (in GHz), the reference bandwidth (40 kHz), the beamwidth of the reference GSO satellite receiving antenna beam (4.0 degrees) and the fact that this is a FSS EPFD limit.[1] Also stated is the worst-case geometry defined by the latitude of the pointing direction of the reference GSO satellite receiving beam and the Δlong (difference in longitude between this pointing direction and the corresponding GSO satellite). This worst-case geometry has been determined by the EPFD validation software to be the worst case (i.e., highest EPFD levels) according to the Recommendation ITU-R S.1503-2. The resulting EPFD level is shown by the blue curve and the EPFD mask is shown by the red line.

Worst-case geometry:
GSO satellite pointing direction latitude = 42.552°N, Δ_{long} = 0.0°



The results above demonstrate that the OneWeb system complies with the Commission's and the ITU's $EPFD_{down}$ and $EPFD_{up}$ limits.

[1] The frequency used for the analysis is determined by the EPFD validation software and is the lower end of the range of frequencies for the particular GSO allocation. For example, the frequency is 14.0 GHz for the FSS frequency range of 14.0-14.5 GHz.