

EXHIBIT 13

RF EXPOSURE ASSESSMENT

Section 1.1307 (b) Environmental Assessment Requirement for Equipment Authorization

Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the preparation of an Environmental Assessment (EA) if the particular facility, operation or transmitter would cause human exposure to levels of radiofrequency radiation in excess of the limits in §§ 1.1310 and 2.1093 of this chapter.

Section 1.1310 Radio Frequency Radiation Exposure Limits

The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Section 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation."

Response

The Nokia **Airscale MAA 64T64R 192AE n77 200W (AEQK)** is typically installed on poles or walls in fixed locations. Therefore, the AEQK is neither a portable nor a mobile wireless device. The Nokia Airscale MAA 64T64R 192AE n77 200W (AEQK) is a 64 port radio head that transmits 3.125 Watts per port over the n77 spectrum (3700 – 3980 MHz). This product supports single 20MHz, 40 MHz, and 100 MHz 5G-NR carriers utilizing QPSK, 16 QAM, 64QAM and 256QAM modulation formats. The 64 individual transmit ports are identical in design, rated power and performance. The RF exposure assessment for the overall AEQK will be evaluated separately to ensure the compliance.

The AEQK provides a massive MIMO adaptive antenna (MAA) solution for n77 band. The AEQK has an antenna panel with 192AE (antenna elements) to perform digital beamforming with up to 4 spatial MIMO streams. The maximum antenna gain is 24.5 dBi.

The information on Nokia supplied antennas is provided in Table 13.1.

The limits specified in FCC Section 1.1310 Table 1(B) for occupational/controlled exposure and general population/uncontrolled exposure, which are tabulated below in Table 13.2, shall be met.

All of the transmitters installed in MBO BTS operate in the frequency range of 3.7 GHz – 3.98 GHz. The maximum power density thus needs to be less than 1.0 mW/cm² for general population/uncontrolled environment and 5.0 mW/cm² for occupational/controlled environment.

Per FCC’s OST/OET Bulletin Number 65, the appropriate EIRP (equivalent or effective isotropically radiated power) limits can be calculated based on the relationship between power density and EIRP, i.e.,

$$S = \frac{EIRP}{4\pi R^2}, \tag{1}$$

where S is the power density in mW/cm², R is the distance to the center of radiation of the antenna in cm and EIRP is in mW.

Table 13.1 AEQK Antenna

Antenna	Model	Antenna Gain (dBi)
Integrated	AEQK	24.5

Table 13.2 Limits for Occupational/Controlled Exposure and General Population/Uncontrolled Exposure (FCC Section 1.1310 Table 1(B))

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Average Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
300 - 1500			F/300	6
1500 – 100,000			5.0	6
(B) Limits for General Population/Uncontrolled Exposure				
300 - 1500			F/1500	30
1500 – 100,000			1.0	30

Note: f = frequency om MHz; *Plane-wave equivalent power density.

When all transmitters operate simultaneously, the EIRP and thus power density from all transmitters gives the worst-case scenario.

Table 13.3 (a) Minimum RF Safety Distances for controlled Exposure

Module	Freq Band (GHz)	Maxi Total P _{out} (64x64) (dBm)	Antenna Gain (dBi)	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	Limit of Power Density S (mW/cm ²)	RF Safety Distance (cm)
AEQK	3700	53	24.5	77.5	56234132.52	5	946.28

Table 13.3 (b) Power Density at the Proposed Minimum RF Safety Distance

Module	Freq Band (GHz)	Maxi Total P _{out} (64x64) (dBm)	Maxi Antenna Gain (dBi)	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	RF Safety Distance (cm)	Limit of Power Density S (mW/cm ²)
AEQK	3700	53	24.5	77.5	56234132.52	947	4.961

Table 13.4 (a) Minimum RF Safety Distances for UnControlled Exposure

Module	Freq Band (GHz)	Maxi Total P _{out} (64x64) (dBm)	Antenna Gain	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	Limit of Power Density S (mW/cm ²)	RF Safety Distance (cm)
AEQK	3700	53	24.5	77.5	56234132.52	1	2115.95

Table 13.4 (b) Power Density at the Proposed Minimum RF Safety Distance

Module	Freq Band (GHz)	Maxi Total P _{out} (64x64) (dBm)	Antenna Gain (dBi)	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	RF Safety Distance (cm)	Limit of Power Density S (mW/cm ²)
AEQK	3700	53	24.5	77.5	56234132.52	2116	0.9999

Results

The results are summarized below in Tables 13.5.

Table 13.5 Minimum RF Safety Distances for AEQK RF Module

Exposure	RF Safety Distance (cm)	Total Power Density S (mW/cm ²)	Limit of Power Density S (mW/cm ²)
Occupational/Controlled	946.28	4.961	5
General Population/Uncontrolled	2115.95	0.9999	1

Therefore, the RF safety distance for the AEQK RF module shall be larger than 946.28 cm or 9.46 m for occupational/controlled exposure and larger than 2115.95 cm or 21.2 m for general population/uncontrolled exposure.