

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 AEQM AirScale MAA 64T64R 192AE B48 32W (AEQM) is typically installed on poles or walls in fixed locations. Therefore, the AEQM is neither a portable nor a mobile wireless device.

The AEQM provides a massive MIMO adaptive antenna (MAA) solution for Band 48. The AEQM has an antenna panel with 192AE (antenna elements) to perform digital beamforming with up to 16 spatial MIMO streams. The maximum antenna gain is 27.5 dBi for 64 ports.

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 the AEQM operate in the frequency range of 3.55 GHz – 3.70 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(a) AEQM Antenna

Antenna	Model	Antenna Gain (dBi)
Integrated Beam Forming	192 AE & 3550 - 3700-MHz	27.5 dBi for 64 ports and 9.45 dBi per port

Table 13.1(b) AEQM Maximum Output Power Measured (32 Ports 8 Streams and 40MHz Bandwidth)

Maxi Conducted Output Power Per Port	Maxi Conducted Output Power Total	Antenna Gain	Maximum EIRP Total
25.51 dBm	39.34 dBm	15.47 dBi	54.81 dBm

Table 13.1(c) AEQM Maximum Output Power Capacity (32 Ports 8 Streams and 100MHz Bandwidth)

Configuration	Output Power EIRP Limit Per Polarization	Maxi Output Power EIRP Total
32T32R, 8 Streams total, 100MHz Bandwidth (future release)	57 dBm	60 dBm

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)	Magentic 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 Uncontrolled Exposure

LTE Band	Freq (GHz)	Maxi Total EIRP (dBm)	Maxi Total EIRP (mW)	Limit of Power Density S (mW/cm ²)	RF Safety Distance (cm)
B48	3.550	54.81	302,691.3	1	155.24

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

LTE Band	Freq (GHz)	Maxi Total EIRP (dBm)	Maxi Total EIRP (mW)	RF Safety Distance (cm)	Power Density S (mW/cm ²)
B48	3.550	54.81	302,691.3	155.5	0.9967

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

LTE Band	Freq (GHz)	Maxi Total EIRP (dBm)	Maxi Total EIRP (mW)	Limit of Power Density S (mW/cm ²)	RF Safety Distance (cm)
B48	3.550	54.81	302,691.3	5	69.43

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

LTE Band	Freq (GHz)	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	RF Safety Distance (cm)	Power Density S (mW/cm ²)
B48	3.550	54.81	302,691.3	69.5	4.989

Table 13.5 (a) Minimum RF Safety Distances for EUT Operation under Maximum Capacity and Uncontrolled Exposure

LTE Band	Freq (GHz)	Maxi Total EIRP (dBm)	Maxi Total EIRP (mW)	Limit of Power Density S (mW/cm ²)	RF Safety Distance (cm)
B48	3.550	60	1000000.0	1	282.1

Table 13.5 (b) Power Density at the Proposed Minimum RF Safety Distance for EUT Operation under Maximum Capacity and Uncontrolled Exposure

LTE Band	Freq (GHz)	Maxi Total EIRP (dBm)	Maxi Total EIRP (mW)	RF Safety Distance (cm)	Limit of Power Density S (mW/cm ²)
B48	3.550	60	1000000.0	283	0.994

Table 13.6 (a) Minimum RF Safety Distances for EUT Operation under Maximum Capacity and Controlled Exposure

LTE Band	Freq (GHz)	Maxi Total EIRP (dBm)	Maxi Total EIRP (mW)	Limit of Power Density S (mW/cm ²)	RF Safety Distance (cm)
B48	3.550	60	1000000.0	5	126.2

Table 13.6 (b) Power Density at the Proposed Minimum RF Safety Distance for EUT Operation Under Maximum Capacity and Controlled Exposure

LTE Band	Freq (GHz)	Maxi Total EIRP (dBm)	Maxi Total EIRP (mW)	RF Safety Distance (cm)	Power Density S (mW/cm ²)
B48	3.550	60	1000000.0	127	4.934

Results

The results are summarized below in Tables 13.7.

Table 13.7(a) Minimum RF Safety Distances for AEQM with 32T32R 8 Streams and 64T64R 16 Streams and 10MHz, 20MHz, 10+20MHz, 20+20MHz

Exposure	RF Safety Distance (cm)	Total Power Density S (mW/cm ²)	Limit of Power Density S (mW/cm ²)
Occupational/Controlled	69.5	4.989	5
General Population/Uncontrolled	155.5	0.9967	1

Table 13.7(b) Minimum RF Safety Distances for AEQM Operation Under Maximum Capacity with 32T32R 8 Streams and 64T64R 16 Streams and 100MHz

Exposure	RF Safety Distance (cm)	Total Power Density S (mW/cm ²)	Limit of Power Density S (mW/cm ²)
Occupational/Controlled	127	4.934	5
General Population/Uncontrolled	283	0.994	1

Therefore, the RF safety distance for the Nokia AirScale MAA 64T64R 192AE B48 AEQM shall be larger than 127 cm for occupational/controlled exposure and larger than 283 cm for general population/uncontrolled exposure when operate under the maximum capacity with 32T32R 8 Streams and 64T64R 16 Streams and 100MHz.