Tecore, Inc.

Health Protection and Radiation Hazards

1.0 INTRODUCTION

This document provides information regarding the assessment of Health Protection and Radiation Hazards expected from the 3GHRFN. The following calculations are presented to show that the 3GHRFN is compliant to the MPE requirements as per FCC Rule Part § 1.1310.

2.0 RADIATION HAZARDS

2.1 CABINET RADIATION

The maximum radiated power levels authorized by the FCC EMC specifications are:

- -36 dBm (or E=2.7 mV/m) for frequencies between 30 MHz and 1 GHz,
- -30 dBm (or E=5.4 mV/m) for frequencies above 1 GHz

According to FCC OET Bulletin 65, the power density is linked to the E field by the relation

$S = E^2/3770$

As a consequence, the maximum power density radiated by the equipment will be:

- $S = 1.9*10^{-9}$ mW/cm^2 for frequencies between 30 MHz and 1 GHz
- $S = 7.9*10^{-9}$ mW/cm^2 for frequencies above 1 GHz

The maximum power density is far below the Maximum Permissible Exposure (MPE) levels shown in Table 1 and therefore the 3GHRFN is compliant with this requirement.

2.2 ANTENNA RADIATION

The FCC Rule Part § 1.1310 Limits for Maximum Permissible Exposure (MPE) (General Population/Uncontrolled Exposure) are shown in Table 1 below.

Frequency Range (MHz)	MPE (S, mW/cm^2)
30 - 300	0.2
300 – 1500	f/1500 (where f = frequency in MHz)
1500 - 12750	1.0

Table 1, Limits for Maximum Permissible Exposure (MPE) (General Population/Uncontrolled Exposure)

Antenna Radiation Calculation:

Considerations:

- HPA Configured for Maximum Transmit Power = 40 Watts
- Feeder Cable Loss = 3 dB (typical)
- Antenna Gain = 18 dBi (Highest Gain Possible)

The power delivered to the antenna is:

P = HPA_Power – Feeder Cable Loss = 46 dBm – 3 dB = 43 dBm (20 Watts)

As described in FCC OET Bulletin 65, the power density can be estimated by the following formula:
$S = (P*G)/4\pi R^2$
Where G is the antenna gain and R is the distance from the antenna

The Maximum Permissible Exposure (MPE) level for uncontrolled access locations is
$S = f/1500 = 894/1500 = 0.6\ mW/cm^2$

As a consequence, the safe distance approach can be calculated as,
R = 4.1 m

This is the distance at which the limit level will be reached in the main beam of the antenna.

Although the 3GHRFN is a transportable product it does not have integral antennas and requires connection to a permanent or semi-permanent antenna system. The antenna used would be mounted on a tower or similar mounting structure 10s of meters in height and therefore would provide adequate safe distance to the general population. It should also be noted that exposures inside buildings can be expected to be reduced by at least 10 to 20 dB due to the attenuation caused by building material in the wall and roof of the building (source: FCC OET Bulletin 65).

Based on the above information the 3GHRFN is compliant to the MPE requirements as per FCC Rule Part § 1.1310.