RF Exposure calculation

Based on FCC 1.1307 & 2.1091, FCC OET Bulletin 65

1. Categorically Exclusion from exposure Evaluation:

According to FCC regulation, RF exposure evaluation is Categorically Excluded if transmitter's operation frequency is less than 1.5GHz and ERP is less than 1.5W.

2. Absolute maximum specification of 4G INTERPRETER transmitter
   - Operational frequency band **450MHz to 470MHz**
   - The 4G Interpreter transmitter is measured for **MAX RF Power 4W**
   - Absolute **Maximum transmission time(duration)** for any 4G INTERPRETER transmitters does not exceed **1s**
   - Transmission period-absolute maximum is **1 transmission per 12 hour**
   - ALL 4G Interpreter transmitters utilize 4GFSK modulation
3. Average RF Power Calculation

FCC regulation on permissible RF exposure are not based on the peak envelope power, but on average power (P_ave) over a 30-minute time period for uncontrolled environments.

As mentioned in (2), during any 30 minutes 4G INTERPRETER can transmit 0.042times. Duration is 1 second.

With maximum RF radiation equal to 4W, the average RF Power over 30 minutes is:

P_ave(worst case) at 30 minute=4×1×0.042/30×60=0.093mW

4. Maximum radiated Power Density prediction (**S**):

The predict power density (**S**) at distance **R=20cm** from transmitter with **P_ave** =0.093mW, next formula is used:

S=P_ave/(4×π× R^2)

For the worst case prediction of power density at or near a transmitter surface let's use:

S=P_ave/(4×π× R^2) =
=0.093mW/(4×3.14×20cm×20cm)=0.019mW/ cm^2

This is the worst case of the near field power density of 4G INTERPRETER transmitter.

5. Maximum Permissible Exposure (MPE) from 4G ITERPRETER

As FCC require, the maximum permissible exposure for general public in "uncontrolled situation" at 20cm is:

MPE=frequency[MHz]/1500=460MHz/1500=0.307mW/cm^2

Compare results in (4) and (5),

S=0.019mW/ cm^2<MPE=0.307mW/cm^2

We see that 4G INTERPRETER fully complies with RF safety at a distance 20cm.

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