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RF Exposure Calculation for InSite BTS GSM 1900

Expected radiation exposure levels versus distance from the transmitter antenna, using equation;

$$\boxed{S = \frac{EIRP}{4pR^2}}$$

where *S* is power density at distance *R* from the antenna, and *EIRP* (Equivalent Isotropically Radiated Power) is the maximum output power times the antenna gain (4dBi). This equation is generally accurate in the far-field of an antenna, and could be used for making a "worst case" or conservative prediction in the near field.[1]

Example at 0.2 m:

$$S = \frac{\text{EIRP}}{4\pi R^2} = \frac{\text{Maximum Output Power} \times \text{Antenna Gain}}{4\pi R^2} = \frac{0.16 \times 2.5}{4\pi 0.2^2} \approx 0.796 \text{ W/m}^2$$

Distance at 10W/m² limit:

$$R = \sqrt{\frac{\text{EIRP}}{4\pi S}} = \sqrt{\frac{\text{Maximum Output Power x Antenna Gain}}{4\pi S}} = \sqrt{\frac{0.16 \text{ x } 2.5}{4\pi 10}} \approx 0.056 \text{ m}$$

Table: RF exposure level versus distance

Distance (m)	0.056	0.10	0.20	1.00
Power density (W/m²)	10	3.18	0.80	0.03

[1] FCC OET Bulletin No. 65, Ed. 97-01, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", August 1997