

## Summary Discussion of RF Fields and the PG&E SmartMeter™ System (2005 Report and 2008 Supplemental Report)

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PGE's SmartMeter™ technology makes use of low-power radiofrequency (RF) transmitters to connect with customers and obtain their meter reads. These low power transmitters are found inside each power meter, in repeater units, and in access points that are typically located well above ground level at various locations within a neighborhood, usually high up on a power pole, street light, or other electrical tower. Access points allow for communication between PG&E and the many SmartMeter™ devices within a neighborhood.

A study of the RF produced by the transmitting components of this system demonstrates that they are in full compliance with Federal Communications Commission regulations by a very wide margin.<sup>1</sup> For example, immediately adjacent to a power meter, the RF field power density is less than 10 microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ), which is miniscule compared to the FCC limit of  $601 \mu\text{W}/\text{cm}^2$  for the 902-928 MHz band. Typical ground-level exposure to access points mounted 25 feet above ground is even lower – more than 15,000 times less than the limits that the FCC applies for such devices. The absolute greatest power density found in the analysis is approximately  $24 \mu\text{W}/\text{cm}^2$ , which would occur in the rare situation that a person is able to enter an area immediately adjacent to repeater units or an access point antenna. Even in this rare case, the level of exposure is many times lower than the FCC's allowable limits.

In comparison to the RF fields that many workaday devices produce in the everyday environment – for example, cellular telephones, microwave ovens, and wireless Internet services – SmartMeter™ devices generally produce far weaker RF. In all cases, even those of access points and/or repeater units, SmartMeter™ related RF is a tiny fraction of what regulatory rules and various international recommendations permit. A comparison of the expected RF densities near SmartMeter™ components and other non-SmartMeter™ items is provided in Table 1 below. Figure 1 illustrates how the RF field varies by proximity to PG&E's SmartMeter™ components.

Based on this analysis, PG&E's proposed SmartMeter™ technology, complies with all existing standards and regulations for RF-exposure.

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<sup>1</sup> PG&E's SmartMeter™ system operates in a frequency band of such low operating power and frequencies that the FCC does not require a license or subject the program to FCC rules on allowable limits. Nevertheless, the study applies the FCC limits, as they represent the most conservative values that any U.S. government agency applies.

**TABLE 1**

<b>Examples of RF Fields Commonly Found in the Everyday Environment in Relation to SmartMeter™ System Operation</b>	
<b>RF Source</b>	<b>Power Density (μW/cm<sup>2</sup>)</b>
Immediately adjacent to a SmartMeter™ device (1 foot)	8.8
Immediately adjacent (1 foot) to a SmartMeter™ access point if elevated to height of transmitter	24
Adjacent to 25 foot high SmartMeter™ access point at ground level	0.03
Installed microwave oven- FDA allowable at 5 cm from door [FDA, 2009]	5,000
Typical RF field in kitchen with operating microwave oven [1 meter] [Mantiplay, et al. (1997)]	10
Cell phones (at head) [Mantiplay, et al. (1997)]	30 – 10,000
Cell phone base stations at ground level (maximum) [WHO (2006)]	1-12
Walkie-Talkies (at head) [Mantiplay, et al. (1997)]	500 – 42,000
Wi-Fi wireless routers, laptop computers, cyber cafes, etc., maximum (~1 meter for laptops, 2-5 meters for access points) [Foster (2007)]	10-20
Median exposure to FM radio and TV broadcast station signals [Tell and Mantiplay (1980)]	0.005

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**FIGURE 1**

**Maximum Power Density vs. Distance for SmartMeter Components**

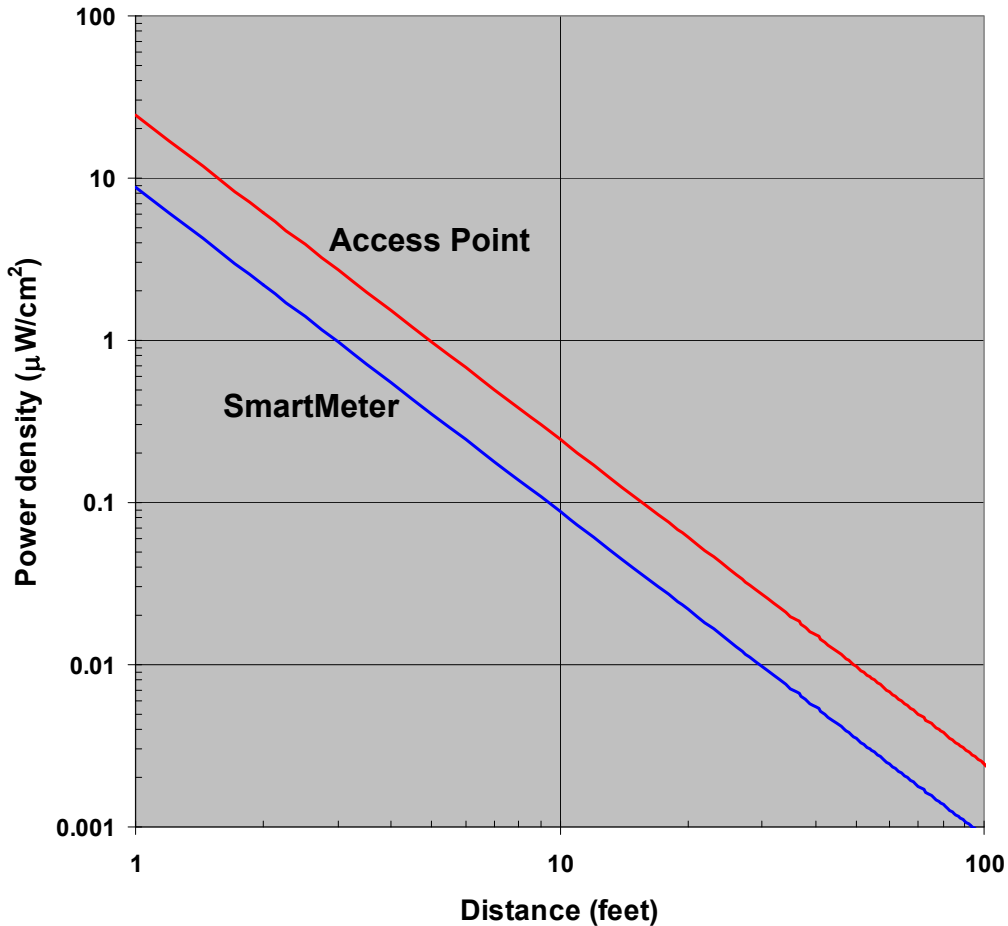


Figure 1. Maximum time-averaged power density associated with different components of the SmartMeter™ system including the SmartMeter™ device itself and access points that are used to communicate with the SmartMeter™ devices within a neighborhood. Repeater units may be installed in some areas and these units have the potential for producing RF fields similar to that of access points. For comparison, U.S. limits for radiofrequency (RF) exposure of the general public are set at 601 microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ) for RF emissions in the frequency band used by the SmartMeter™ devices and access points.

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