

# Smart Meters and Radio Frequency Communications

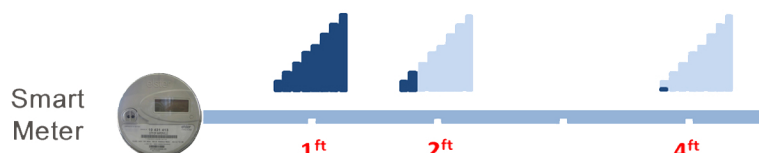


A smart meter is a digital electric meter that records electricity usage and power quality data and can then relay that information back to the utility via a two-way communication system. Embedded within the smart meter are a transceiver and an antenna used to wirelessly transmit and receive data. The exposure a person receives to radio frequency (RF) signals from a smart meter is determined by: their distance from the meter, how often the meter is transmitting, and the power level of the meter.

## Key Information:

### 1. Distance from the Device Matters

Smart meter signal strength **decreases by a factor of four every time you double distance** from the meter.



### 2. Short Transmission Time

Naperville smart meters only communicate for a fraction of a second per transmission and will typically transmit for approximately one minute total per day.

### 3. Smart Meters are Low Power Devices

The smart meters in Naperville transmit at power levels similar to or lower than common household devices such as Wi-Fi routers, cell phones, baby monitors, etc. When the low power levels of the smart meter are combined with short transmission times, the resulting power density is significantly lower than that of common household devices.

## Exposure Levels (All units are $\mu\text{W}/\text{cm}^2$ )

Cell Phone <sup>1</sup> (at ear)		Max 5000.0 Min 1000.0	Footnotes: 1. Source: EPRI, Radio-Frequency Exposure Levels from Smart Meters, February 2011, pg 9. 2. Source: Tropos manufacturer RF data applied to the NSGI system design. 3. Minimum distance to unit is standing underneath the Tropos router on the street light. 4. Source: Elster meter manufacturer RF data applied to NSGI system design. 5. Maximum Transmit duty cycle is 0.1% and a maximum antenna gain in front of meter is 3.66. 6. Antenna gain drops by 20 times behind meter and inside the home. 7. The NSGI Smart Meter and Tropos Wireless Router Power densities are based on worst case calculations. Measurements done in the field have been proven to be much lower than these worst case calculated values.
Microwave Oven <sup>1</sup> (at two feet)		Max 200.0 Min 50.0	
Wi-Fi Router <sup>1</sup> (at three feet)		Max 1.0 Min 0.2	
FM Radio/ TV Broadcast <sup>1</sup>		Max 1.0 Min 0.005	
Tropos Wireless Router <sup>2,3,7</sup> (twenty feet below device)		Max 0.0140 Min 0.0070	
NSGI Smart Meter <sup>4,5,7</sup> (three feet in front of meter)		Max 0.0087 Min 0.0002	
NSGI Smart Meter <sup>4,5,6,7</sup> (three feet behind meter inside home)		Max 0.00044 Min 0.00001	

## 4. The Bottom Line

Due to the three factors explained above, a person sitting 10 feet in front of their smart meter would have to be there for more than 100<sup>1</sup> years to receive the same RF energy that they would receive from a 3 minute cell phone<sup>2</sup> call. If a person were sitting inside their home 3 feet from the back of the smart meter, they would have to be there for more than 200<sup>1</sup> years to receive the same RF energy as they would from a 3 minute cell phone<sup>2</sup> call.

<sup>1</sup> Meter Specifications: Front of Meter -Duty Cycle - 0.1%, AMI Radio Power - 250 mW EIRP, Distance - 10 ft. (305 cm); Behind Meter - Duty Cycle -0.1%, Distance - 3 ft. (91 cm)

<sup>2</sup> Cell Phone Specifications - Duty Cycle 45%, Peak Transmitter Power after antenna - 600 mW EIRP, Distance - 1 cm