

A wide-angle, high-angle photograph of a city at night, viewed from a rocky, elevated vantage point. The city lights are a dense grid of yellow and orange, contrasting with the dark blue and black of the night sky and the foreground. The foreground shows dark, jagged rocks and some sparse, dark vegetation. The city extends to the horizon, with mountains visible in the distance under a twilight sky.

EVOLVE

THE 2014 SENSUS UTILITY CONFERENCE

RF Emission Safety

Presented by:

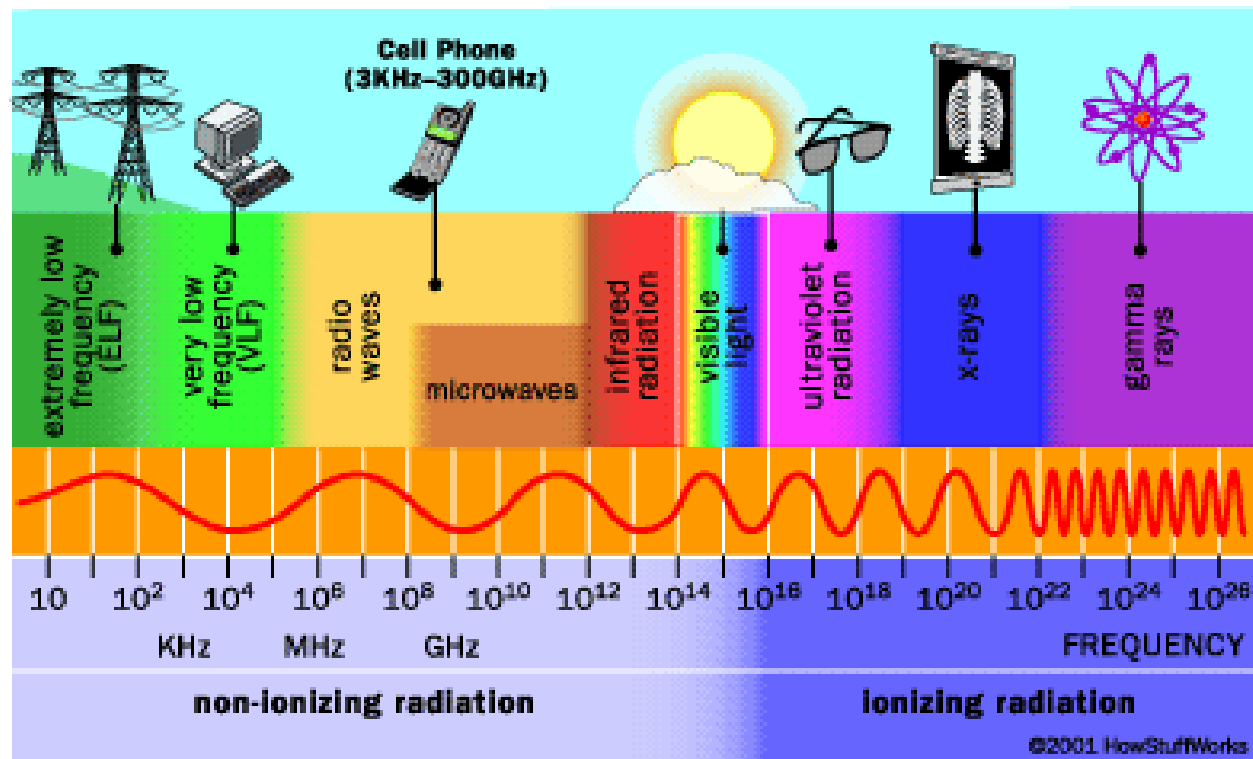
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This presentation will enable you to:

- Understand the definition, the types, and the effects of radiation.
- Understand how a SmartPoint compares to every day devices.
- Understand how Sensus Water, Gas, and Electric SmartPoints comply to industry guidelines.

Radiation

- Energy that comes from a source and travels through material or space (light, heat, sound).



Radiation

- All radiated waves can excite atoms in material to some degree.
- Ionizing radiation waves contain sufficient energy to separate electrons from atoms which can cause permanent material damage.
- Radio Frequency radiation is non-ionizing radiation.

So what should I be concerned about?

- “The mechanisms by which RF exposure heats biological tissue are well understood and the most marked and consistent effect of RF exposure is that of heating, resulting in a number of heat-related physiological and pathological responses in human subjects and laboratory animals...”

*Electric Power Research Institute Report: “Radio-Frequency Exposure Levels from Smart Meters: A Case Study of One Model”, February 2011

Smart Meters Versus Other Devices

- Device Relative Power Density in milliwatts per square centimeter (mW/cm²):

SmartMeter™ device at 10 feet	0.1	
Cyber cafe (Wi-Fi)	10-20	x150
Laptop computer	10-20	x150
Cell phone held up to head	30-10,000	x50,000
Walkie-Talkie at head	500-42,000	
Microwave oven, two inches from door	5,000	x50,000

Source: Richard Tell Associates, Inc.³

FCC's Permissible Exposure to SmartPoints

- The Power Density (mW/cm²) Exposure Limit for the General Population specified by the FCC for Uncontrolled Exposure to mobile apparatus is given by this formula:

$$S = f / 1500 \text{ mW/cm}^2$$

- Where:

S = Power Density

If f = 880MHz

$$S = 0.6 \text{ mW/cm}^2$$

Continuous Exposure to SmartPoints

- The FCC assumes continuous exposure from a device like the SmartPoint, and relates distance to power density according to this formula:

$$S = P * G / 4\pi R^2$$

- Where:

S = Power Density; 0.6 mW/cm²

P = Power to antenna of the SmartPoint; 30dBm

G = Antenna Gain; 1

- Solving for R:

R = Radius of emitted power from antenna = ~13cm

Time Averaged Exposure to Electric SmartPoints

- SmartPoint transmission is not continuous and the FCC allows for Transmission Time Averaging in its calculation of MPE according to this formula:

$$S_{\text{exp}} * t_{\text{exp}} = S_{\text{limit}} * t_{\text{limit}}$$

- Where:

S_{exp} = Allowable Time Averaged Power Density of Exposure

t_{exp} = “Worst Case” time of transmission in 30 min window; 61.85 secs

S_{limit} = Power Density Limit; 0.6 mW/cm² (from prior calculation)

t_{limit} = FCC time exposure limit; 30 mins = 1800 secs

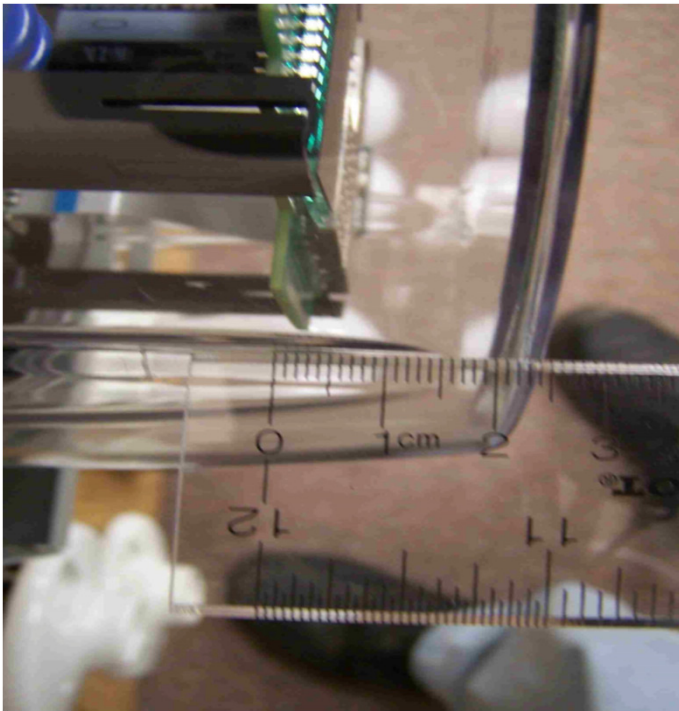
- Solving for S_{exp} :

$$S_{\text{exp}} = 17.4 \text{ mW/cm}^2$$

Time Averaged Exposure to Electric SmartPoints

- The FCC allows Time Averaged exposure from a device like the SmartPoint, and relates distance to power density according to this formula (same as before):

$$S_{\text{exp}} = P * G / 4\pi R^2$$



- Solving for R:
 $R = 2.14\text{cm}$
- “R” the radius of emitted power from antenna is ‘under glass’.

Time Averaged Exposure to Gas & Water SmartPoints

- For Gas and Water SmartPoints:



- Solving for R:
 $R = 1.65\text{cm}$
- “R” the radius of emitted power from antenna is ‘under glass’.

Summary

- RF radiation is non-ionizing.
- Thermal effects are not proven, but haven't been disproven.
- Cell Phones generate ~50,000x more exposure than SmartPoints.
- Sensus Point to Point produces less exposure than Mesh technologies.
- Sensus Technology is flexible to adapt to changing regulatory requirements.

For More Information

- <https://sensus.com/rf>
 - No Health Threat From Smart Meters (UTC Study)
 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (OET Bulletin 65)
 - Radio-Frequency Exposure Levels from Smart Meters: A Case Study of One Model (EPRI)