RF Emission Safety

Presented by:

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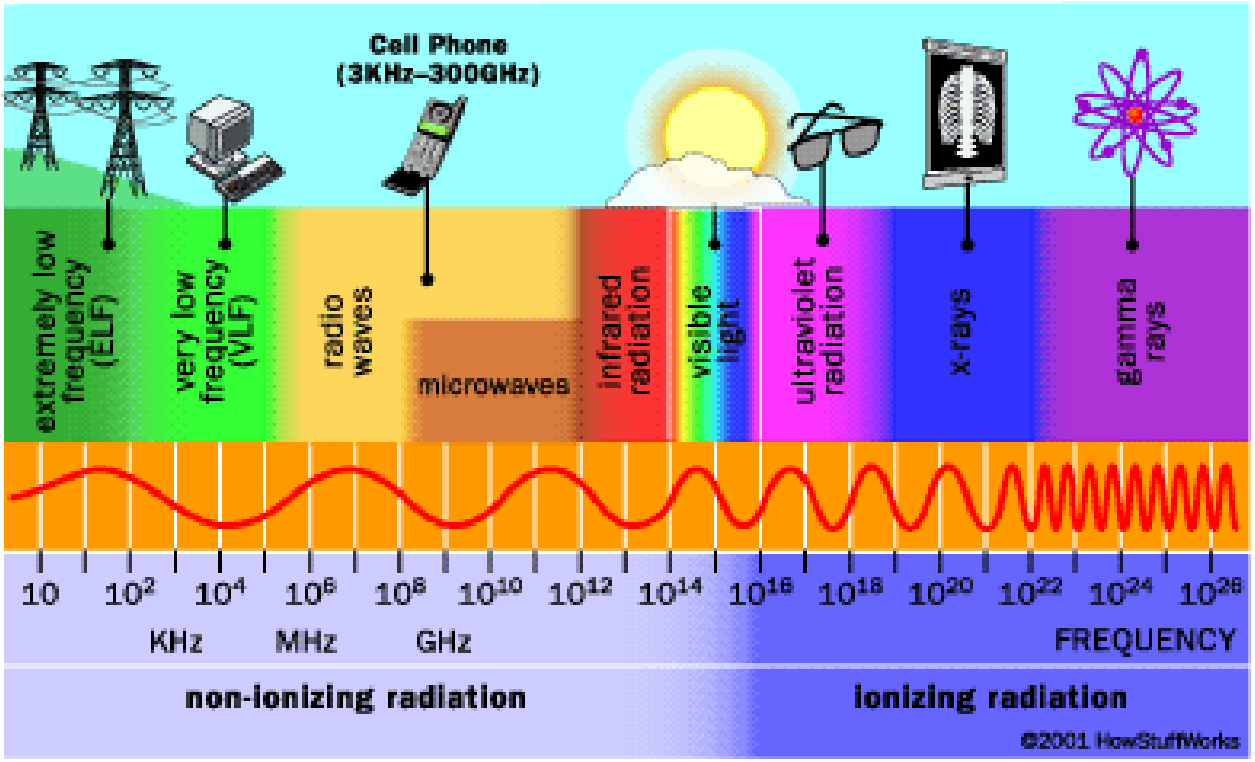
This presentation will enable you to:

- 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/cm^2):

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/cm^2) Exposure Limit for the General Population specified by the FCC for Uncontrolled Exposure to mobile apparatus is given by this formula:

$$S = f / 1500\ mW/cm^2$$

- Where:

S = Power Density

If f = 880MHz

$$S = 0.6\ mW/cm^2$$

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/cm^2

  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:

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

- 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/cm^2 (from prior calculation)

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

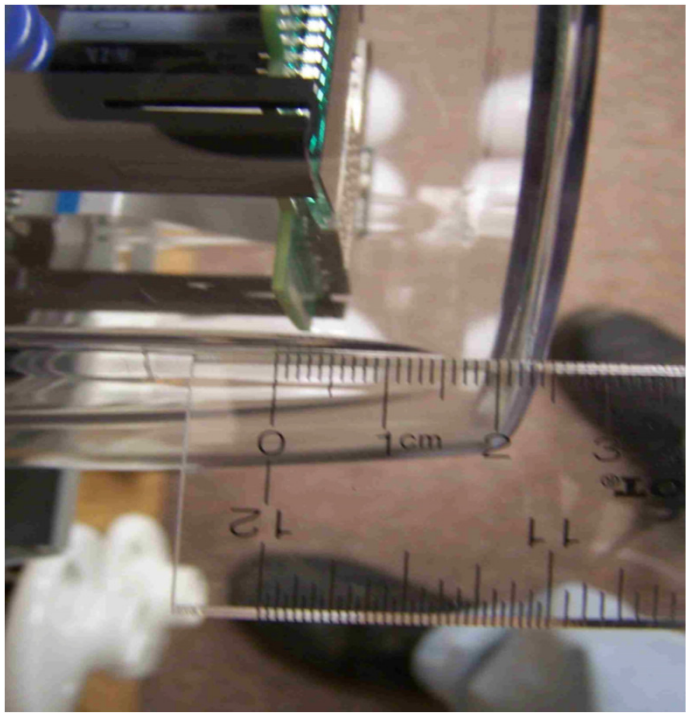
- Solving for S_{exp}:

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

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):

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



- Solving for R:

  R = 2.14cm

- "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 = 1.65cm

- "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)