



# Radio Frequency

Radio Frequency (RF) energy is all around us. It plays a critical role in the communications systems that we depend on every day, such as police and fire radio systems and pagers, radio and television broadcasts, and cellular telephones. Many of the conveniences we've grown accustomed to in our homes, such as cordless phones and wireless internet (WiFi), utilize radio frequency.

Since 1996, the Federal Communications Commission (FCC) has required all wireless communications devices sold in the United States meet minimum guidelines for safe human exposure to radio frequency energy. In addition, federal health and safety agencies including the Environmental Protection Agency (EPA), Food and Drug Administration (FDA), National Institute for Occupational Safety and Health (NIOSH), and the Occupational Safety and Health Administration (OSHA) consistently monitor and regulate RF safety.

Itron's products are stringently evaluated for RF safety and meet all Federal Communication Commission (FCC), Industry Canada (IC), and Institute of Electrical and Electronic Engineers (IEEE) standards. We consistently evaluate key factors for exposure risk including the frequency of the transmission, the power output, and the distance from the public.

- » Limited time on the air: Our endpoint devices transmit for very short intervals spread throughout the day and thus have a very small duty cycle. This results in RF exposure levels that are a fraction of the limits specified by regulatory agencies, including the FCC and Industry Canada.
- » Low power: Our devices are low power: one watt or less. These low levels of RF exposure are well below the regulatory limits and less RF energy than a typical cellular network.

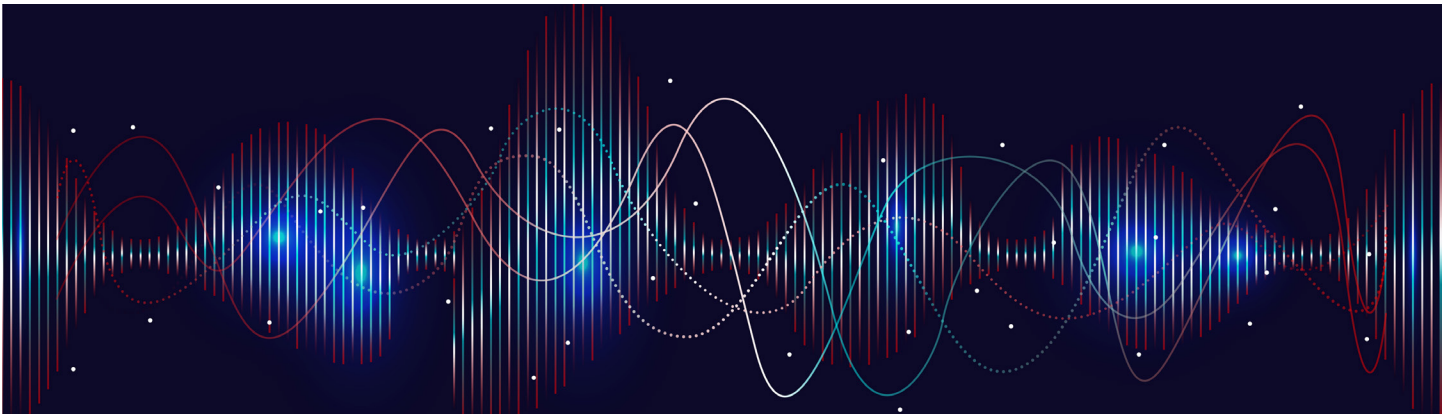
- » Limited proximity to humans: Our devices are typically installed outside the home. Since RF energy falls off very quickly with distance, this typically represents much lower exposure than other RF devices located within the home.

According to several reputable organizations, including the Electric Power Research Institute and Utilities Telecom Council, there is no demonstrated cause and effect relationship between low levels of RF exposure and adverse human health effects. Itron recognizes that concerns about RF emissions exist. As such, we continue to monitor the regulations and perform extensive RF testing to actively minimize RF emission levels by all means possible.

## WIRED SOLUTIONS

Currently, no wired metering solutions are available for residential smart grid applications. Itron's meters are designed to be communications technology agnostic, which theoretically means they are capable of supporting a variety of communication options. However, no wired options have been developed for two main reasons:

1. Customer and marketplace needs ultimately determine what other communications capabilities a smart meter platform must support. Thus far, the marketplace clearly and overwhelmingly stated that wireless technology represents the best solution approach for a variety of reasons. Without market demand, large R&D costs of a wired solution cannot be justified.
2. Existing telecommunications (PSTN/POTS) or cable infrastructure in jurisdictions around the world are not robust or secure enough to support an end-to-end metering solution. Further, these infrastructure services are delivered by third parties outside of utility control, exposing both the electricity grid and consumer information to unauthorized access.



## RF FREQUENTLY ASKED QUESTIONS (FAQS)

### Q: What is radio frequency? How is it measured?

**A:** Electromagnetic fields, radio waves, microwaves and wireless signals are collectively referred to as radio frequency (RF) energy. RF energy is all around us. It's used in various electronics and appliances, including radio and television broadcasting, cellular telephones, satellite communications, microwave ovens, radars, and industrial heaters and sealers, to name a few.

Electromagnetic waves are measured by wavelength and frequency. Wavelength is the distance covered by one complete cycle of the electromagnetic wave. Frequency is the number of electromagnetic waves in one second, also known as hertz or Hz. One Hz equals one cycle per second. One megahertz (MHz) equals one million cycles per second. Generally, microwaves are radio frequencies measuring more than one GHz.

### Q: Is there a health hazard associated with radio frequency?

**A:** According to several reputable organizations, including the World Health Organization (WHO) and Utilities Telecom Council, there is no demonstrated cause and effect relationship between low levels of RF exposure and adverse human health effects. Itron recognizes that concerns about RF emissions exist. As such, we continue to monitor the regulations and perform extensive RF testing to actively minimize RF emission levels by all means possible.

The WHO notes in their [backgrounder](#) on base stations and wireless technologies that:

“To date, the only health effect from RF fields identified in scientific reviews has been related to an increase in body temperature (> 1°C) from exposure at very high field intensity found only in certain industrial facilities, such as RF heaters. The levels of RF exposure from base stations and wireless networks are so low that the temperature increases are insignificant and do not affect human health.”

### Q: How is it regulated? Are there any safety limits on human exposure to wireless and RF fields?

**A:** Since 1996, the FCC has required all wireless communications devices sold in the United States meet minimum guidelines for safe human exposure to radio frequency energy. The limits established in the guidelines are designed to protect public health with a very large margin of safety. In addition, federal health and safety agencies including the EPA, FDA, NIOSH and OSHA consistently monitor and regulate RF safety.

The FCC has established exposure guidelines for RF devices operating in the 300 kilohertz (kHz) – 100 GHz range. These safety guidelines are outlined in the publication, [OET Bulletin 65 Edition 97-01](#), Evaluating Compliance with FCC guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.

The general population exposure limits set by the FCC for the frequency range utilized by Itron smart meters and other devices – like cordless phones and baby monitors – is frequency in MHz/1500 mW/ cm<sup>2</sup> for devices operating below 1500 Mhz and 1 mW/ cm<sup>2</sup> for those operating above 1500 Mhz. This gives the maximum values (provided in the following table) for an uncontrolled environment.

<b>Cellular Low Bands</b>	0.45 mW/ cm <sup>2</sup>
<b>915 ISM Band</b>	.60 mW/ cm <sup>2</sup>
<b>Cellular Mid Bands</b>	1.0 mW/ cm <sup>2</sup>

When an Itron battery powered smart meter is transmitting, the exposure to radio frequency energy at 20 centimeters (8 inches) from the meter is at least 10 times lower than the exposure limit set by the FCC. This calculation is for radio frequency energy radiated outward from the front of the meter. The power transmitted toward the rear of the meter is typically a further five- to ten-times lower. The following table lists the calculated values for the Itron battery powered cellular products.

<b>Cellular Low Bands</b>	0.04 mW/ cm <sup>2</sup>
<b>915 ISM Band</b>	.01 mW/ cm <sup>2</sup>
<b>Cellular Mid Bands</b>	0.04 mW/ cm <sup>2</sup>



**Q: Where can I learn more about regulatory compliance?**

**A:** The FCC’s document *OET Bulletin 65 Edition 97-01, Evaluating Compliance with FCC guidelines for Human Exposure to Radiofrequency Electromagnetic Fields* details how to measure or calculate levels of RF radiation and to determine compliance of RF facilities with exposure limits.

Additionally, FCC OET Bulletin 65 supplement C Edition 01-01 (known as OET-65C) provides further guidance on determining compliance for portable and mobile devices.

These documents may be found at [www.fcc.gov/oet/rfsafety](http://www.fcc.gov/oet/rfsafety).

**Q: What is a smart meter?**

**A:** Itron defines smart meters as devices that are like minicomputers on houses and businesses. They communicate back and forth with the utility to automatically transmit meter information, such as energy consumption, spikes in power usage, and power outage and restoration messages to support various applications beyond monthly billings. Our smart metering solutions have substantially more features and functions than our advanced metering systems and technology. Smart meters can collect and store interval data, perform remote service connect/disconnect, send detailed information, receive commands, and interface with other devices, such as in-home displays, smart thermostats and appliances, home area networks, advanced control systems, and more.

Alternately, advanced metering involves one-way communication of meter data. Advanced metering uses a communication module embedded in the meter to collect and store detailed meter data, which is transmitted to handheld computers, mobile units, and/or fixed networks, allowing utilities to collect the data for billing systems and analyze the meter data for more efficient resource management and operations. Itron’s advanced meters and RF-based technologies include non-OpenWay CENTRON meters; SENTINEL meters; METRIS meters; and electric, gas and water ERT communication modules.

<sup>1</sup> FCC Office of Engineering & Technology Bulletin 56: “Questions and Answers About Biological Effects and Potential Hazards of Radiofrequency Electromagnetic Fields” (Fourth Edition, August 1999)

**Q: Are Itron’s smart meters certified by the FCC?**

**A:** Itron’s products are stringently evaluated for RF safety and meet all Federal Communication Commission (FCC), Industry Canada (IC), and Institute of Electrical and Electronic Engineers (IEEE) standards.

**Q: How is Itron addressing the issue of RF safety?**

**A:** Itron consistently evaluates key factors for exposure risk including the frequency of the emission, the power output, and the distance from the public. Specifically, our devices have limited airtime, low power, and limited human exposure.

» **Limited time on the air:** Our endpoint devices transmit for very short intervals spread throughout the day and thus have a very small duty cycle. This results in RF energy levels that are a fraction of the exposure limits specified by regulatory bodies, including the FCC and Industry Canada.

» **Low power:** Our endpoint devices are extremely low power; less than one watt. These low levels of RF exposure are insignificant, generating far less RF energy than a cellular network.

» **Limited proximity to humans:** Our devices are typically installed outside the home. Compare that to a cell phone, which is held directly to the side of the head.

**Q: Will a smart meter interfere with a security system, pacemaker, cell phone, or other RF devices?**

**A:** Itron’s meters operate in compliance with FCC regulations that require coexistence with other RF devices operating in the 902-928 MHz band. The low-power design and frequency hopping techniques of Itron’s meters help reduce the probability of interference with other wireless devices. Itron’s cellular based smart meters are based on the same technology and comply with the same FCC regulations as cellular phones. Based on standards and regulations from the FCC and FDA, Itron believes that the likelihood of interference between our meters and other RF devices is extremely low.

The US Food and Drug Administration (FDA) requires pacemaker manufacturers to test their devices for susceptibility to electromagnetic interference (EMI) over a wide range of frequencies and to submit the results as a prerequisite for market approval. Electromagnetic shielding has been incorporated into the design of modern pacemakers to prevent RF signals from interfering with the electronic circuitry in the pacemaker<sup>1</sup>.

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