

Smart Meter Radiation

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ABSTRACT

Smart meters are wireless, high-tech, digital communication devices that will replace the old, analog electricity meters and allow remote electricity readings. Smart meters emit electromagnetic radiation, like cell phones and other high-tech electronic devices. Like any other device that emits radio frequency radiation, smart meters have not been proven to cause health problems. This paper provides some ways of protecting yourself from RF radiation produced by smart meters.

Key words: Smart Meters, Smart Grid, Electromagnetic Radiation.

1. INTRODUCTION

As a result of industrialization, urbanization, and modern technology, the environment has been subjected to electromagnetic pollution. Today we are surrounded by electronic devices such as cell phones, laptops, iPads, computers, radio, and TV. Consumers are increasingly concerned with the level of radiation that is emitted by these electronic devices. Throughout the United States and other parts of the world, electric power utilities have been implementing advanced metering infrastructure, also known as smart meters.

To bill a customer for utilities such as electricity, natural gas, or water, the amount the customer uses must be measured. This is usually done with a meter. In the past, in order to see how much utility power a home was using, a meter reader had to come around to each individual house and take the reading. With the introduction of the smart meter, readings can then be taken through the grid. Most utility companies around the world are transitioning from analog meters to smart meters [1].

Current technologies such as smart meters (also called Advanced Metering Infrastructure) have become a source of electromagnetic pollution from generated electromagnetic radiation. All electrical/electronic devices produce electromagnetic pollution, which depends on the amount of voltage and current they use. The main high density sources (both natural and man-made) of EM radiation include wireless communication, power transmission lines, smart meters, common electronic devices (such as smartphones, tablets), radars, transformers, antennas, and portable computers.

2. OVERVIEW OF SMART METERS

Smart meters (SMs) are essentially digital meters that read remotely over a secure wireless network. They are an important component of the smart grid system which allow for a two-way flow of communication between the meters and utility companies. Smart meters are electronic devices that transmit 24/7 electricity usage to the utility using radio-frequency (RF) communication. They are the next generation of electricity meters and are part of the smart grid.

The smart meters have the following features [2].

- Communication is a critical technological requirement for smart meters. They allow for a two-way flow of real-time communication between the meters and utility companies.
- SMs provide automatic processing, management, and utilization of metering data.
- They provide real-time data that can be used to balance electric loads, and reduce blackout-related power outages. The data can be transmitted using dedicated communication lines, wireless communication, or power line communication (PLC).
- They can read real-time energy consumption data including the values of frequency, voltage, and phase angle.
- They are able to connect/disconnect service and read meter consumption remotely.
- They measure and record electricity usage at hourly intervals and send that data to the utility.
- They can be used to monitor and control home appliances and devices at the customer's premises.

- They can help utilities identify outages more quickly, pinpoint the locations, and ensure outage resolution at every meter location.
- Smart metering system can be used to provide additional services such as safety, security, telemedicine, and social alarms.

Smart meters are a new, green technology that use the same radio frequency (RF) fields as cell phones. They act as interface points between the smart grid and commercial/home appliances. They are being regarded with great favor in homes and business globally. They are being deployed all over the world in an effort to create a new generation of utility service. As shown in Figure 1, the smart meter operates within a Home Area Network (HAN) which is in the Neighborhood Area Network (NAN), communicating with the utility company and with other smart meters in the area [3].

3. RADIATION DUE TO SMART METERS

Electromagnetic (EM) radiation is an important environmental variable in any smart grid.

EM fields are present everywhere in our environment. As shown in Figure 2, the electromagnetic spectrum is divided up into a number of categories [4]. Although EM fields are invisible, they create or induce voltages and currents within the human body. Both radio frequency and microwave field radiations have been increasing.

While smart meters adequately perform their function, they are also sources of dangerous, powerful electromagnetic radiation. Several smart meters use digital signals to transmit consumption information to utility companies wirelessly. In the process, these meters emit wireless radiation. A smart meter transmits in every direction. RF radiation travels far, which is why it is used for communication. The intensity of the radiation decreases exponentially in proportion to distance from the smart meter increases. Typically, smart meters transmit as far as two miles. The people in proximity to a smart meter are at the same risk of radiation exposure as with a cell phone. The radiation interact with other electrical devices like TV and washing machines. Smart meters transmit data to a utility access point, which in transmit data to the utility company.

It has become a practice to specify the strength of the field produced in the human body of an exposed person by the specific absorption rate (SAR), which is the rate at which energy from the incident field is deposited. SAR is difficult to measure inside the human body; numerical methods are commonly used [5].

The EM pollution penetrates the walls of the home and causes some negative effects on the human body. Some customers have reported headaches, dizziness, ringing in their ears, poor sleep, chronic fatigue, heart problems, stress, nausea, chest pain, eye problems, cancer, etc. after a smart meter was installed on their home.

How much power people are exposed to from the smart meter radiation depends on how far they are from the smart meter antenna and how the smart meter transmits. The frequency radiated by a smart meter is similar to that of a typical cell or cordless phone. Since smart meters produce RF radiation, some claim that smart meters may possibly increase cancer risk or cause health problems. Smart meters operate at radio frequencies (RF) specifically between 902 MHz and 2.4 GHz. Radio frequencies are non-ionizing and harmless [6]. In-depth investigation by the World Health Organization (WHO) showed that the small amount of RF energy produced by smart meters is not harmful to human health. The WHO classifies RF as a 2B carcinogen. RF energy is well below the limits set by Federal Communications Commission (FCC).

4. EM RADIATION REDUCTION

As mentioned above, electric companies claim that radiation from smart meters is non-ionizing and therefore harmless. But not all researchers and radiation experts agree with this. Both homeowners and counter-experts have contested the official assurances that smart meters do not pose health risks [7].

Exposure to RF radiation for long period of time increase the risk of cancer. The US safety limit for RF radiation is 1,000 micro-watts per meter squared. Some smart meters emit up to 60 times that, or 60,000 micro-watts per meter squared. One should take the "better safe than sorry" approach.

How can we reduce exposure to EM radiation from smart meters? To reduce or eliminate RF Radiation caused by your smart meter, there are a couple of things that you can do [8,9].

(1)Some power companies have smart meter opt out programs. They will replace your smart meter with an analog meter that does not emit any RF Radiation.

(2) Install a Smart Meter Guard. This is a cover you can place over your smart meter made out of a conductive metal mesh screen that will block 90% to 95% of the normal radiation of the smart meter

(3) Shield the wall behind the smart meter to block the radiation from entering your home. Shield the interior wall behind the smart meter with shielding paint or fabric.

(4) The ideal way to treat electrohypersensitivity (EHS) to reduce EM exposure. Maintain a 40-foot distance between you and your smart meter.

(5) You can counteract the harmful effects of smart meter radiation using QuWave Harmonizer. (www.Quwave.com). The Harmonizer protects everyone within its reach from smart meter and other radiating devices.

5. BENEFITS AND CHALLENGES

Smart meter is a digital device allowing two-way communication between the utility company and the customer, cutting out the need for meter-checking agents and eliminating the practice of estimated bills. Separate myths from reality and take advantage of the benefits of a smart meter.

Smart meters make a landmark change in the modern electric power grid. Smart meters make life easier for everyone. They not only measure electricity consumption, they can also measure electricity produced (solar panels or other power generation) and sent back to the grid the new technology is posed to open up opportunities for smarter tariffs, more sustainable living, and smarter homes [10].

However, smart meters are still new to many people. They are expensive and this is the reason they are not favored by everyone. The greatest challenge that smart meters face is that they radiate RF emissions which may be dangerous for health of humans. Smart meters have become a target for those who like to fearmonger about EM radiation it produces. There is little scientific data specific on smart meters. Some people fear that smart meters will be used to invade our privacy.

6. CONCLUSION

A smart meter is a digital device used to measure the electricity consumption of your home. It uses wireless technology to communicate the energy consumption (in terms of kilowatt hours) automatically to the utility company in real-time. Smart meters are gradually replacing old, conventional, analog meters around the world. RF radiation they produce is harmless.

In spite of the many potential benefits of SMs, the deployment of SMs has created public opposition that centers on health risks and the formation of anti-smart-meter organizations [11]. Although SMs give off RF radiation, it is low-energy radiation. There is no agreement among scientific experts as whether the radiation is harmful or not. There is one thing that experts agree on: Overexposure to EM radiation is dangerous.

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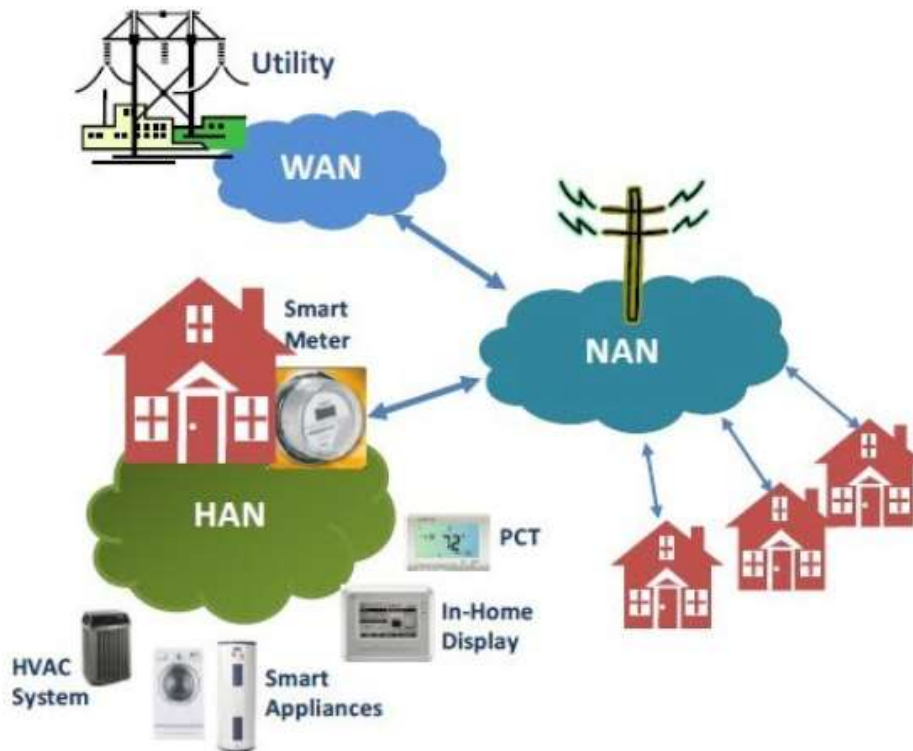


Figure 1 The smart meter operates within a Home Area Network (HAN) [3].

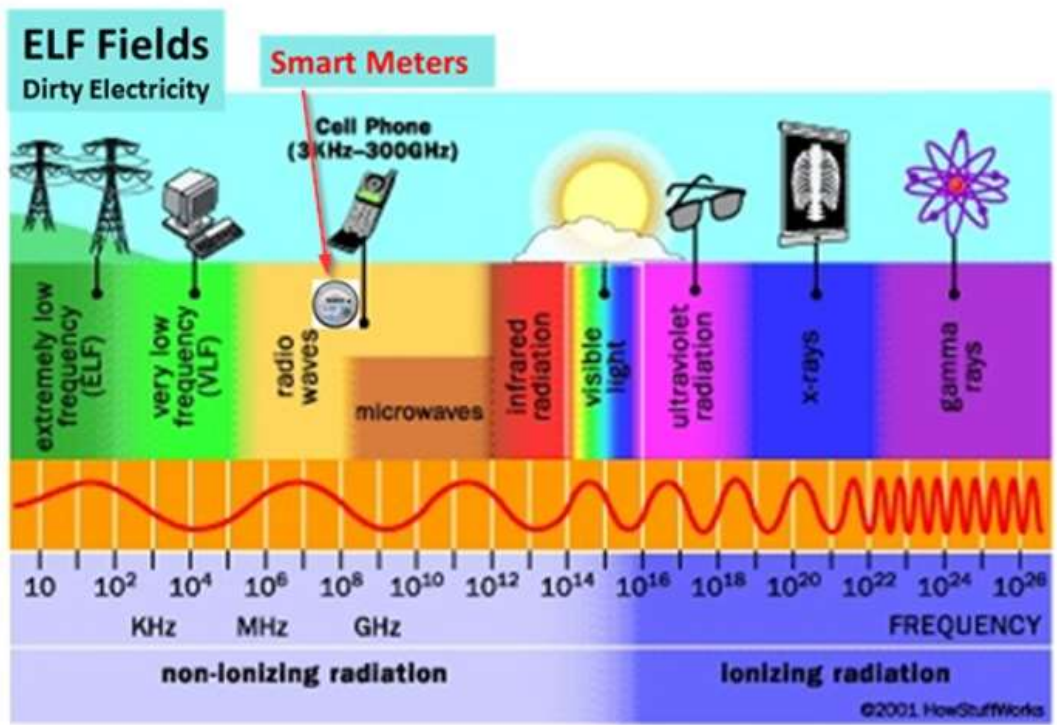


Figure 2 The electromagnetic spectrum [4].