Smart Meter
Safety Whitepaper

Smart meters have been in the media largely for the benefits to utilities and their communities. However, there also has been concern from some citizens regarding the possible health impact of smart meters.

This document has been provided by Transparent Technologies to educate both utility professionals and the general public about the operation of the innov8-VN register and innov8-VNr remote.

General Operations

The innov8-VN register and innov8-VNr remote contain a module which allow for communications on the Verizon Wireless network. Their operations follow the same radio frequency guidelines as a common cellphone.

However, the VN endpoints are non-rechargeable, battery-powered devices. To maintain battery life for 10+ years, the devices must conserve power. Therefore, the VN endpoints only transmit data once per day. The innov8-VN and VNr operate as a register or remote continuously but are scheduled to wake up and log into the Verizon Wireless network once daily sometime between 1am and 6am local time (super off-peak time for the network). The time duration to log onto the network, send the daily broadcast and then disconnect takes between 20 to 30 seconds. Under certain circumstances, the meter data management system may send a command to the endpoint which would extend the link for a few more seconds. Therefore, the entire extent of the wireless communications is equivalent to a very short call or text message.

Transmission Details

The following details provide more technical information on the specifications of the wireless (cellular) communications of the innov8-VN and innov8-VNr and also compare them to some common devices.

Before outlining and comparing RF power levels it must be emphasized that all types of RF energy exposure covered in this document are of the **non-ionizing** type of electromagnetic radiation. This means that the radio-frequency transmissions from these devices are not capable of causing any damage to DNA simply because the wavelengths are too large to be able to be absorbed and cause any kind of damage to skin or body tissues.

This is in contrast to **ionizing** radiation which occurs in X-rays, tanning booths, and the ultraviolet part of the spectrum, and have small enough wavelengths and carry enough energy to change the atomic structure of cells and actually alter genetic code.

This distinction is very important because the only way that non-ionizing radiation can affect the human body is limited to thermal effects that simply warm the tissue and even then these thermal effects only occur at high power levels that are much higher than the devices covered in this document.

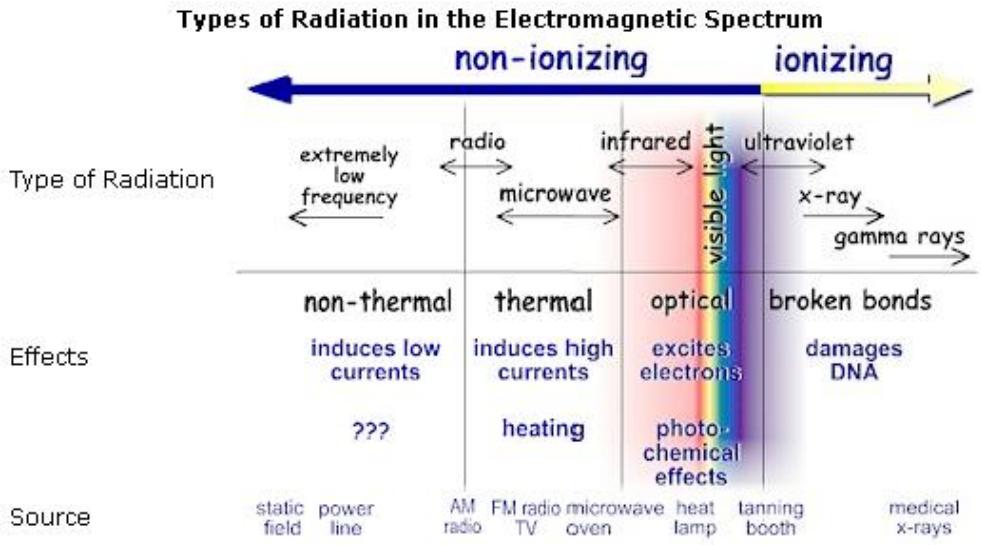

Figure 1

The FCC outlines Maximum Permitted Exposure (MPE) limits of power density of RF signals for the general public in CFR Title 47 Part 1 § 1.1310. Power density is typically measured in milliwatts per square centimeter and is analogous to the brightness of a patch of light created on a surface in a room with a single light bulb at the center. As the wattage of the bulb increases any given spot in the room gets brighter, and the power density goes up.

The following charts show data calculated for various devices and how they compare to the limits in addition to each other. The first chart in Figure 2 just shows the power levels that each device transmits.

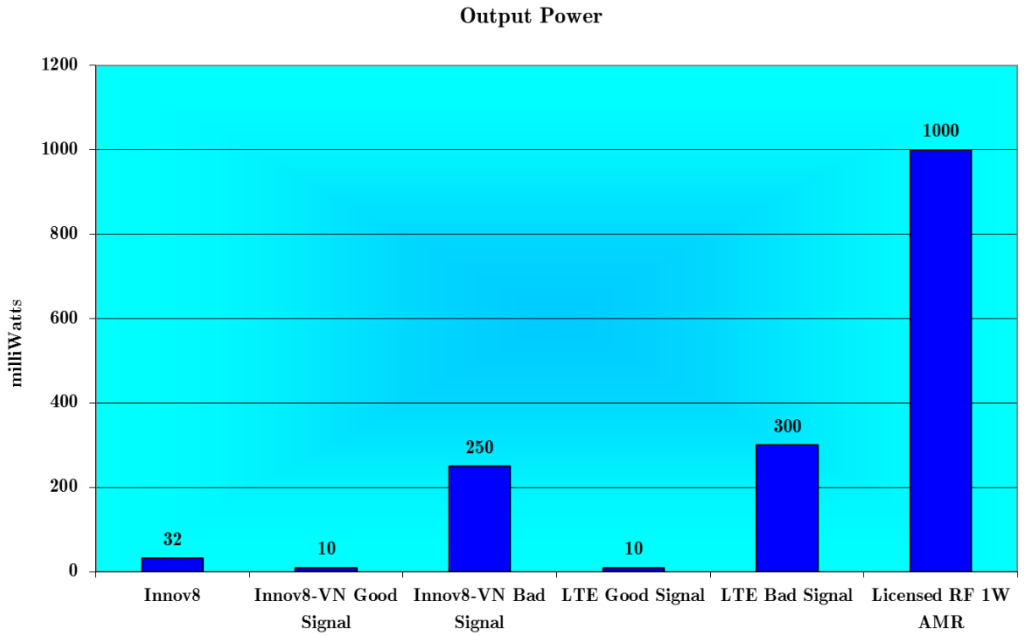

Figure 2

The next chart in figure 3 shows the calculated exposure levels (in milliwatts per square centimeter) for the various devices, when measured from a distance of one inch from the source of the transmission. The results are averaged over time to account for the fact that the Innov8 and the Licensed RF 1W AMR are not continuously transmitting and only transmit less than 0.1% of the day, and the innov8-VN is averaged due to transmitting only 30 seconds out of the entire day.

Cell phone usage is LTE power levels averaged at 2 hours per day. The leakage radiation level of a typical microwave oven at the same distance of one inch is shown for comparison, which is not averaged. The MPE limits for each type of device are also shown with solid red lines.

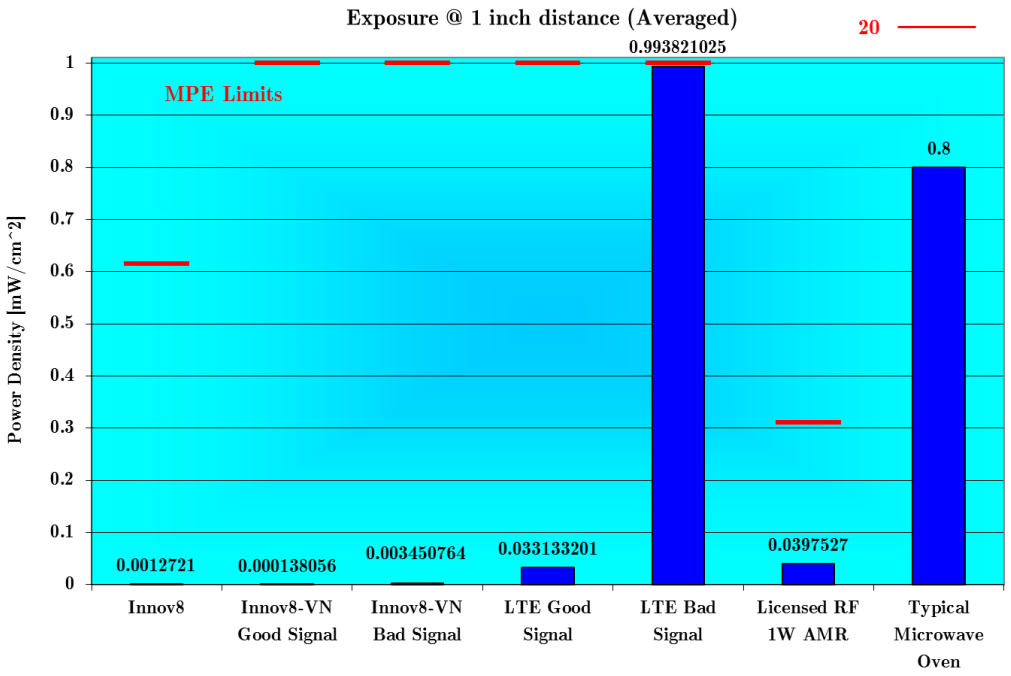

Figure 3

Lastly, the final chart in figure 4 shows the exposure levels calculated at three meters (approximately ten feet) from the source. These results are also averaged over time to account for the fact that the Innov8 and the Licensed RF 1W AMR are not continuously transmitting and only transmit less than 0.1% of the day, and the innov8-VN is averaged due to transmitting only 30 seconds out of the entire day. Cell phone usage is averaged at 2 hours per day.

The leakage radiation level of a typical microwave oven at the same distance of three meters is shown for comparison, which is not averaged. The nearest MPE limit line is four orders of magnitude above the highest calculated value, which makes the exposure levels practically immeasurable and consequently negligible.

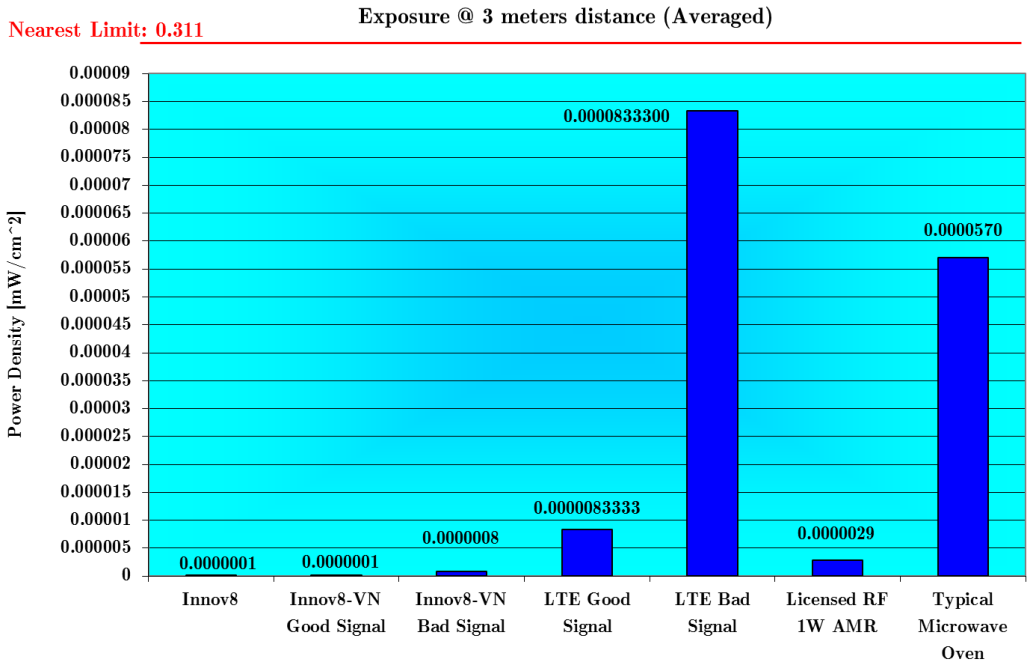

Figure 4

Conclusions

Utility customers are right to have concerns about smart meters and their potential health effects. T2 has strived to design and deliver a system which provides all of the technical benefits to the utility with negligible effects on humans. The power levels, timing and duration documented here show that the innov8-VN and innov8-VNr units should not be considered any type of health risk.

References:

FCC CFR Title 47 Part 1 § 1.1310
http://www.gpo.gov/fdsys/pkg/CFR-2011-title47-vol1/xml/CFR-2011-title47-vol1-sec1-1310.xml

FCC OET Bulletin 65
http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf

EPA Radiation Protection
http://www.epa.gov/radiation/understand/ionize_nonionize.html

FDA Microwave Oven Radiation
http://www.fda.gov/Radiation-EmittingProducts/ResourcesforYouRadiationEmittingProducts/ucm252762.htm

Health effects of Microwave Oven Radiation
http://www.ccohs.ca/oshanswers/phys_agents/microwave_ovens.html

Power Density Calculator Utilizing Methods From FCC OET Bulletin 65
http://hintlink.com/power_density.htm