AMI Meters add to CO^2/Climate Change and Higher Bills

By William Bathgate, BBEC, EMRS, IEEE RFSO
Vice President of the
Residential Consumer Group
January 25, 2023

Note: This report has been written in terms that a common person with limited knowledge of electricity and engineering can understand.

The Effect of the Appeals Court Ruling on Digital Meters

Policy makers working to serve the interests of their communities and the general public would benefit from the information to follow.

But first, policy makers need to be aware that the utilities claims of compliance with FCC guidelines refer to the Telecommunications Act of 1996 are unfounded due to the United States Court of Appeals for the District of Columbia Circuit decision on Aug. 13, 2019 establishing that the FCC's refusal to update their guidelines was "arbitrary and capricious". This decision was upheld on Aug. 20th, 2021 when the court stated:

…the agency demonstrated "a complete failure to respond to comments concerning environmental harm caused by RF radiation." The court found the FCC ignored numerous organizations, scientists and medical doctors who called on them to update limits and the court found the FCC failed to address these issues:

- impacts of long term wireless exposure
- impacts to children,
- the testimony of people injured by wireless radiation,
- impacts to wildlife and the environment
- impacts to the developing brain and reproduction.

See https://ehtrust.org/in-historic-decision-federal-court-finds-fcc-failed-to-explain-why-it-ignored-scientific-evidence-showing-harm-from-wireless-radiation/

BACKGROUND: William S. Bathgate

William practices as a professional in electrical engineering and mechanical engineering disciplines. He was recently employed at Fiat Chrysler Automotive on electronics systems for such things as radio communication for electric and autonomous vehicles etc. William was previously employed through late 2015 for 8 years at the Emerson Electric Company. While at Emerson Electric he was the Senior Program Manager for Power Distribution Systems and in charge of RF and IP based digitally controlled high power AC power switching system product lines in use in over 100 countries. He was also directly responsible for product certifications such as UL (USA), CE (EU), PSE (Japan) and many other countries electrical certification bodies. He is very familiar with the electrical and electronic design of the AMI meters in use because he was responsible for very similar products with over 1 Million units installed across the world. William also has over 20 years work experience with IBM and Hewlett Packard in computer systems design and manufacturing.

He holds a DOD Top Secret Clearance, serving in Cyber Security with the US Missile Defense Agency, NASA and Homeland Security. He is a Certified Building Biologists and a Certified Electro Magnetic Radiation Specialist by the Building Biology Institute https://buildingbiologyinstitute.org/. He is an IEEE Certified Radio Frequency Safety Officer and conducts radio antenna surveys for assurance to the FCC specifications.

He is Vice President of the Residential Consumer Group https://residentialcustomergroup.org/. This organization has legal representation in all Public Utility Rate Cases submitted in Michigan. To date the group has caused the cancellation of numerous rate increases in excess of over 1 Billion in increased utility costs to Michigan Residents.

He has done this analysis due to his own curiosity without conflict of interest of this new technology. He has 40 Years work experience in design and deployment of:

High tech power management systems, UPS and power distribution
Switched Mode Power Supplies
Electrical and Electronic hardware engineering
Computer systems engineering
Radio Systems design and testing
High Current and High Voltage switches
Internet communications using both wired and wireless technologies
UL, CE (Europe), Africa, Japan, Australia and China product safety certifications
Cyber encryption (DOD Level) and protection of Radio Communications using digital signals
RFI/EMI mitigation

Agenda – What you need to know

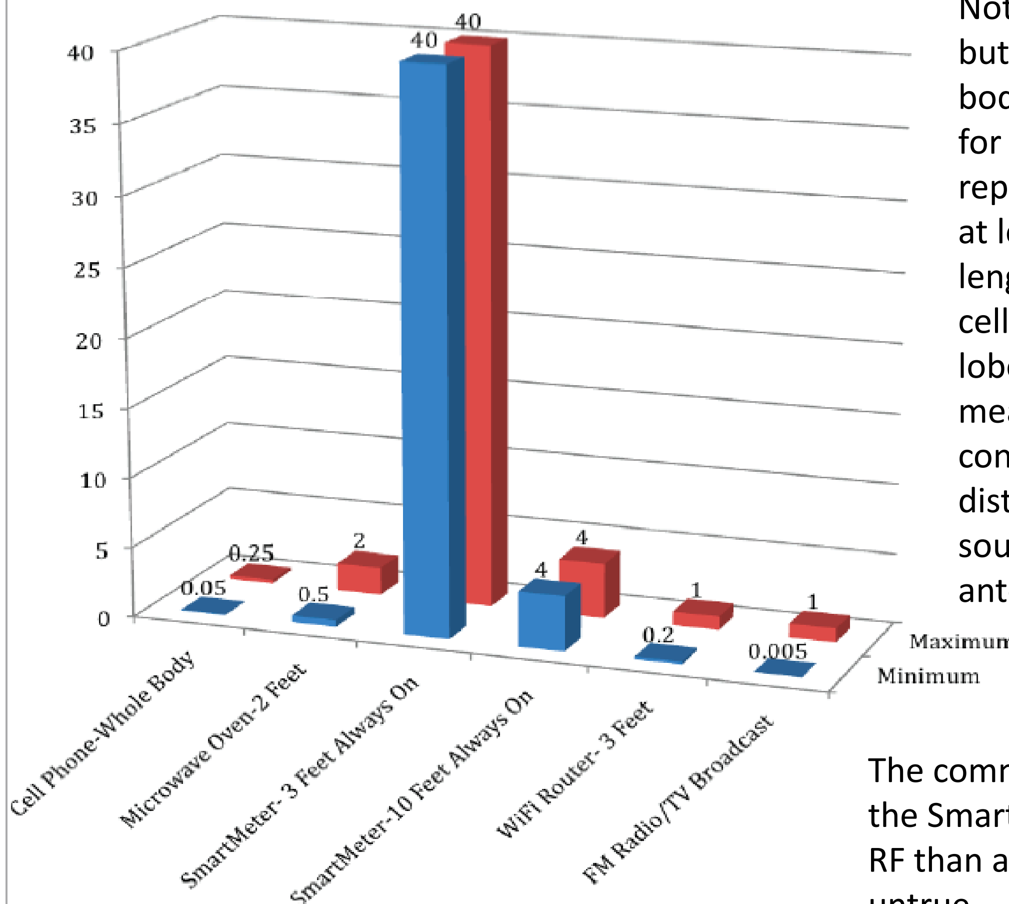
- **The assertion that the RF from an AMI meter is less than a cellphone is simply proven as untrue.**
- **The AMI meters are increasing CO^2 causing climate change, not preventing it.**
- **Billing and KWh/Carbon Footprint calculation issues you were not told of.**
- **The infrastructure of AMI networks are not 100% secure and private. Analog meters are.**
- **The suggestion that consumers can use AMI meter information to reduce their energy use is a fabrication because the consumer data is not real time. The one Day old data is useless.**
- **The suggestion that AMI meters are more accurate is false. AMI and analog meters both have to meet the ANSI C12 specifications on accuracy.**
- **The Meter RF signal can travel 1,400 – 1,500 feet, right through a brick wall, making an opt out program useless in an apartment complex scenario. This is from the one of the meter manufacturers itself.**

It is not less than a cell phone call
The Truth on RF Smart Meter Emissions

μW/CM²
Note: 1μW/CM²
= 10,000 μW/M²

The Smart meter is 400,000 μW/M² peak @ 10 ft it is 100,000 μW/M² peak

Smart Phone is 0.25 μW/CM² = 2,500 μW/M² peak



Note – Initial ERPI report but corrected for whole body exposure vs at the ear for a cell phone. The original report from CCST measured at less than 3 RF wave lengths from the source i.e. cell phone right at the ear lobe. When conducting RF measurements you must consider the recommended distance between the RF source and the instrument antenna. Typical rule is 3.

The common assertion that the Smart Meter emits less RF than a cell phone is untrue.

Source – Dr. Daniel Hirsch on the CCST Report – is all in μW/CM²
CCST = California Council on Science and Technology

Examples of Digital Meter Installations in Apartment Buildings

Note this is exceeding the FCC equipment Grant separation distance of 20 cm

Where:
S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

MPE Calculator for Mobile Equipment Limits for General Population/Uncontrolled Exposure*							
Transmit Frequency (MHz)	Radio Power (dBm)	Power Density Limit (mW/Cm2)	Radio Power (mW)	Antenna Gain (dBi)	Antenna Gain (mW eq.)	Distance (cm)	Power Density (mW/cm^2)
902.25	21.36	0.60	136.77	3.5	2.239	20	0.061
2405	-3	1.00	0.50	4	2.512	20	0.000
824	32.4	0.55	1737.80	0	1.000	20	0.346
1850	30	1.00	1000.00	3	1.995	20	0.397

Summation of Power Densities – Simultaneous Transmissions
This device contains multiple transmitters which can operate simultaneously and therefore the maximum RF exposure is determined by the summation of power densities. The maximum power density as calculated by a summation of power densities for each transmitter is as follows

GPRS Modem Operating in the 800MHz Cellular Band:

900MHz LAN: 0.061 (mW/cm^2)
2.4GHz Zigbee: 0.000 (mW/cm^2)
GSM 850 (GPRS): 0.346 (mW/cm^2)
TOTAL: **0.407 (mW/cm^2)**

Examples of Digital Meter Installations in Apartment Buildings

From the FCC Equipment Grant (ITRON Meter Example)

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TOTAL:	**0.407 (mW/cm^2)**

µw/cm²	µw/m²	Plus gain of 3.5
0.407	4,070.00	14,245.00

Examples of Digital Meter Installations on Exterior Walls

Albemarle St. and Nostrand Ave. in Brooklyn

51^{st} Street between 4^{th} and 5^{th} Avenue in Brooklyn

Building Biology International Safety Standards for RF for Human Exposure

RF Radiofrequency Radiation		No Concern	Slight Concern	Severe Concern	Extreme Concern
Power Density in microwatt per square meter	µW/m²	< 0.1	0.1 - 10	10-1000	> 1000

As anyone who walks within 3 Meters of these meters their exposure is considered an Extreme Concern @ 14,245 µW/M²

How far can the AMI meter transmit?

- Between 1,400 ft and 2,300 ft. An AMI can also transmit thru a brick wall, wood, drywall etc.

Landis+Gyr
manage energy better

CONFIDENTIAL TO LANDIS+GYR

- Service Disconnect/Reconnect Commands for 0.5% of residential advanced electric meters population per day (which includes prepay customers)
- Meter configuration for 0.5% of electric population per day
- Firmware downloads for electric population twice yearly
- Advanced meter change outs for 0.1% of electric population per day
- Meter Events pushed for 1.0% of advanced electric endpoint population per day (Tamper Alarms, Quality of Service Alarms)
- Endpoints communicate to other endpoints and Routers at up to 115.2 kbps
- Routers communicate to other Routers and Collectors at up to 115.2 kbps

- The following are standard Propagation parameters:
  - The antenna for C6500 Series Collector is installed at a minimum of 20 feet above ground level (AGL) on poles and a minimum of 45 feet if installed at a substation
  - As a standard, Router antennas are installed at a minimum of 20 feet AGL
  - Typical design communication ranges for endpoint to endpoint communication is up to 1,400 feet
  - Typical Router to endpoint communication is up to 2,300 feet
  - Typical Router to Router communication is a half mile to two (2) miles depending on standard power output, antenna, foliage, buildings, and terrain

How far can the AMI meter transmit?

- At 1,400 ft and 2,300 ft. RF would impact a consumer especially in an apartment or condo complex. If just one consumer request an opt out meter, that consumer would be impacted by anyone within 1,400 feet that has an AMI meter. The same is true in single family home residences or neighborhood.

- The utility consistently states the RF emissions of the meters meet FCC requirements, this is a misleading statement. FCC requirements are for the effects of enough non-ionizing power to cause the brain to heat up 1° C. This is a deception because there are effects of non-ionizing radiation. There have been over 800 peer reviewed independent studies not funded by the industry that have linked this type of low level non-ionizing RF radiation to a group of diseases including brain cancer, Parkinson's, Alzheimer's, high blood pressure, tinnitus, skin rashes and open sores as an example. Industry funded studies always fail to point our that 32% of their funded studies show an effect on health from non-ionizing radiation. The industry NEVER mentions these studies. This adds to confusion on the health effects attributed to the meters. I have personally met many of the affected consumers and this is no joke or set of psychological conditions.
- https://magdahavas.com/wp-content/uploads/2020/04/Havas-5G-health-humans-and-biota-April-15-2020.pdf

AMI – "AMI - Smart Meters" use power from the Grid to operate – This adds to Climate Change

- **Consider that the AMI meter is actually a powerful computer, not a just a meter. In fact, the federal government classifies the AMI as a computer, not a meter.**
- **The AMI meters require power from the grid to run the computer inside the meter.**
  - **There is a Two Way radio in each AMI meter**
  - **There are special circuits that convert the AC power to DC to power the electronics of the circuit boards, CPU's, memory switching power supplies, LCD's, a solenoid and many others functions, etc. Those all consume power.**
  - **<u>The analog meter consumes no power to operate</u>. It has no electronics inside.**

How much power does the AMI meter consume?

- I did a field test of the meter on my own home. I was in a unique position of not living in the home at the time and there were no lights or appliances operating.
- I turned all the breakers off in power panel, so there was nothing “On”.
- The result was the AMI meter consumes ~2.7 KWh ’s per day on average. Multiply that times the number of meters. It’s a big number. It did not “Save” any power.
- Subsequently I built a special test set up so I can repeat the same test at any time. I can plug in any AMI meter in and see how much power the meter consumes all by itself. I get the same ~2.7 KWh ’s/day regardless of meter brand. Analog meters consume no power.

My Smart Meter Test Setup

Proof - My Field Test - My Energy Insight Readings – Michigan example

Average Daily AMI kWh Use 2.37 kWh @ 0.13 per kWh = $0.31/day (865 kWh/Yr.)

This data was from Detroit Edison, as the reported power consumption on the home, with all the power off!

Note – No breakers were on and the time and reading of the meter is not a simple "Text" message these are clearly two way communication activity and the power to run the meter itself. It is not the same as a simple cell phone call.

Impact to the Environment – Detroit Example

Annual Cost per Customer	Rev $ per Detroit Edison	Rev $ per Consumer Energy	kWh per Detroit Edison	kWh per Consumer Energy	CO^2 Per Detroit Edison	CO^2 Per Consumer Energy
$113.15/Yr.	$235.35M	$203.67M	1.816B	1.521B	3.924BT	3.879BT

Total Consumer Costs Yr.	Total kWh Consumed Yr.	Total CO^2 Per Yr. (Coal @ 2.16lbs per kWh)
$439.02M	3.337B	7.803BT

Note: Solar is 2.2 Lbs. total Embedded CO^2/kWh including Mining, transport, maintenance, etc.

Conclusion: There is absolutely NO evidence the AMI Meter program saves CO^2, energy in kWh or money, in fact it only drains the bank accounts of the impoverished consumer, pads utility revenue and adds to Global Climate Change.

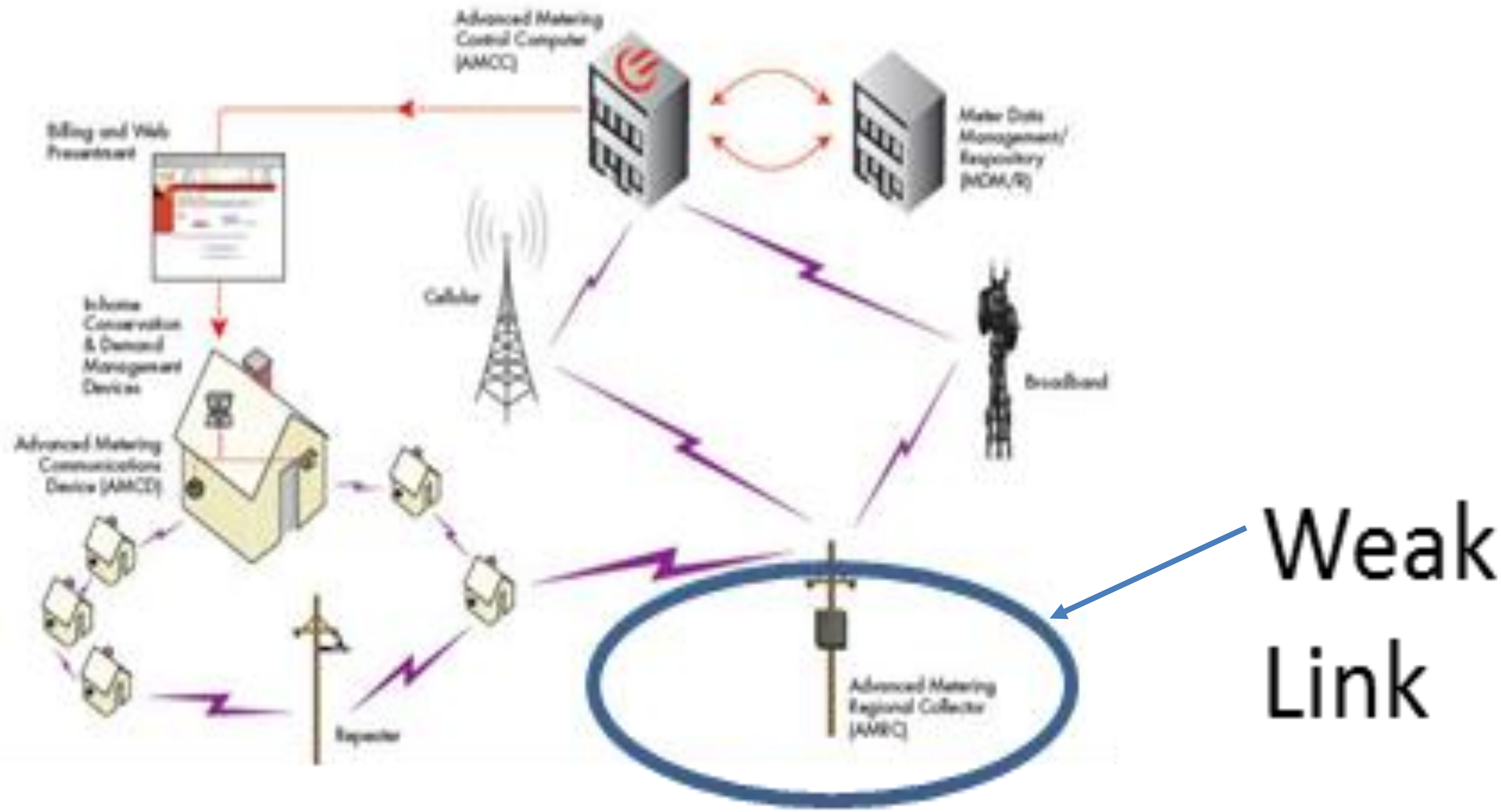
The only way the AMI program will save kWh's is to use it to ration power to consumers via Demand Response/Time of Use rate structures at 5-10 X normal rates where the elderly, disabled and young families with a parent and small children at home can least afford it or do without power during the Demand Response/Time of Use period. Under this scenario the AMI program is the largest fleecing of the consumer to ever exist and a deception to our citizens regarding saving power, reducing costs, reducing CO^2 and protecting our environment. We would be better off taking the money to be invested in AMI meters and plant trees.

AMI is not Secure – It has a Physical Back Door

There is a special tool that is used to program the meter. A malicious actor can easily obtain one of these tools.

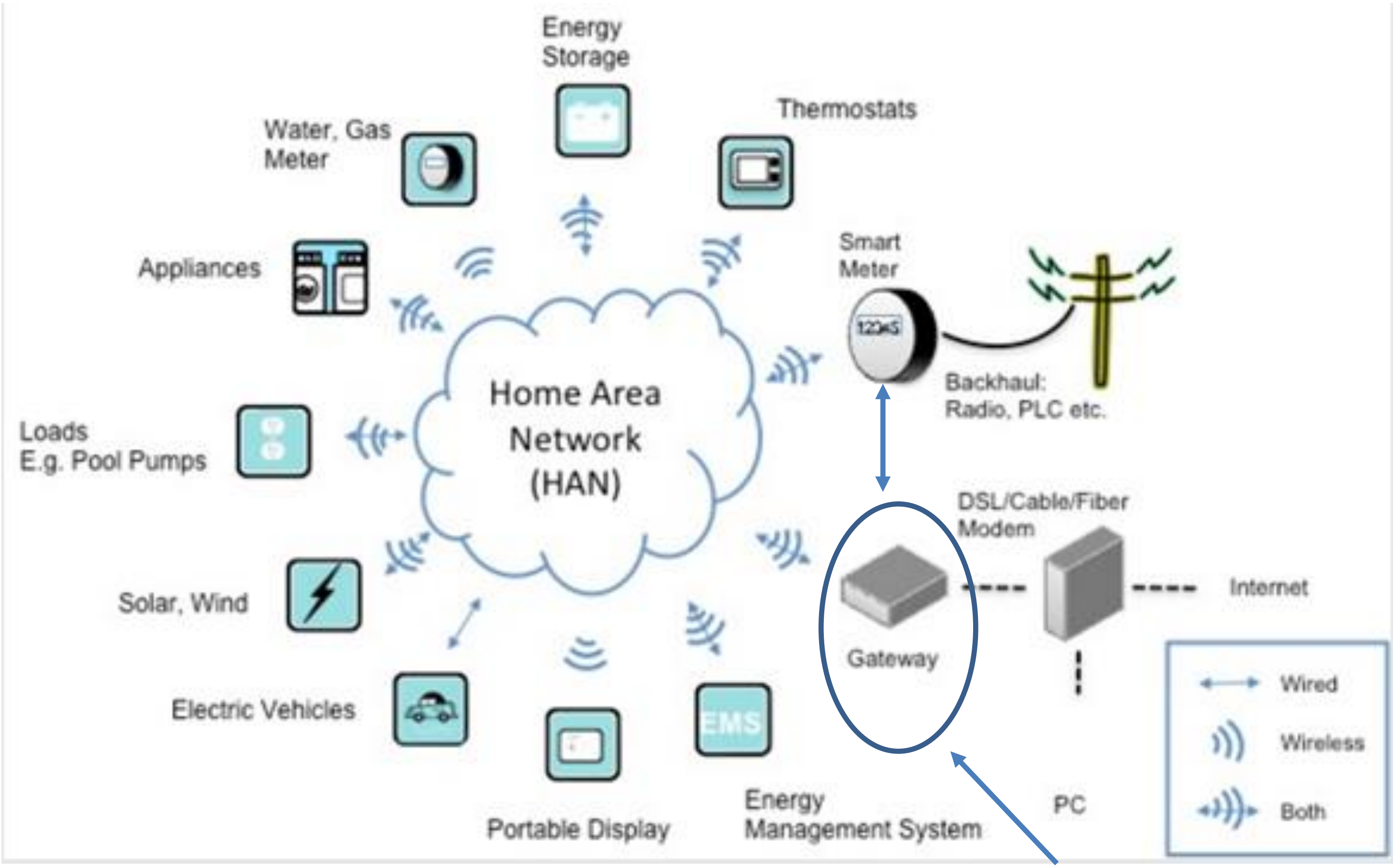
A physical connection to the meter directly by-passes encryption, allowing privacy to be violated and hacking risk; insertion of code, altering the network traffic and injecting malicious code. They can even shut down the power. The default passwords are published in the meter documentation.

Network Weak Link



A malicious actor can send a strong RF broadband signal (multiple frequencies all at once) pointed at this network point, blocking transmission and no readings can be sent to the utility. The AMI meters have tamper protection in them and when they do not get an acknowledgment back from the utility over a certain period of time they begin to shut down. You do not need to know the encryption key, just block the transmission to the network access point with an overwhelming RF signal

Back Door to the Data, Zigbee Net



Once access via the gateway is enabled there is no firewall to block data access, so personal email, video downloads data, etc. can be accessed by utilities and hostile actors. If you can get on the ZIGBEE network you can observe all this type of data. I can easily hack my neighbors ZIGBEE 2.45 GHz network and see all his information Realtime.

Smart Meter - Day Old Data - will never let a consumer help prevent a “Brown Out”

Note – These are the readings of my electric use coming from DTE. This data is a day old. It is impossible to adjust my usage today based on usage from yesterday. Yesterday is gone and nothing can be done about it. Unless the meter information is “Continuously Real Time” there is no purpose in building out this capability. The utility costs to provide day old data is pointless. It is cute to see this information but the consumer cannot change behavior to effect a result to something that has already occurred.

AMI versus Analog Meter Accuracy

Key Differences

- *Analog Meter*
  - The Analog meter has a direct one-for-one relationship between the current consumed in kWh's and the wheels turning the dials. There is no influencing factor or software that can alter this relationship. Also, since this is a current measuring device with no electronics, it is not readily affected by extremes in temperatures and humidity or short circuits.

  - The analog meter has a means to direct excessive power surges to the house ground rod per UL 1449 specs. The life span of the analog meter is typically 30-50 years and is UL Listed (which means it is stamped with the UL logo). It has the same ANSI C12 specs for accuracy as the AMI meter. Categorizations that the AMI meter is more accurate is not true, since they both must meet the same ANSI C12 specs.

AMI versus Analog Meter Accuracy

Key Differences

- *AMI Meter*
  - The AMI measured current does not have a one-for-one relationship between current consumed and indicated reading. This must be measured via an electronic sensor, converted to a digital signal and then a computer calculation averages all of the sensor input and posts the data in computer memory and the reading on the LCD display. There is a manipulation of the indicated reading that can be affected by many factors.

  - All electronics components are rated between 1% to 20% accuracy. Most of the components on the AMI meters are 5% rated, with the current transformers rated at 1% accuracy within the permitted range of temperatures. I will point out that this 1% is only related to temperature, **not the measured load characteristic**. This is important because testing at the University of Twente in 2016 showed very high smart meter inaccuracies of 582% (https://www.utwente.nl/en/news/2017/3/313543/electronic-energy-meters-false-readings-almost-six-times-higher-than-actual-energy-consumption) with current transformers, such as in the all AMI meters, are generally accurate to within ±10%. That is a 20% range. So claims by utilities that the AMI is more accurate is highly suspect. This is only true in a very tightly controlled setting such as ten 100 watt incandescent bulbs, not with electronic appliances, motors, CFL's, LED's etc. (Note - a 100 watt light bulb can vary 5%)

AMI versus Analog Meter Accuracy

Key Differences

- *The ANSI C12 Standard – "Gold Standard" Missing*
  - The standard that all meters must meet is ANSI C12. It sounds impressive, however, there are two extremely important characteristics that this standard leaves out – a Gold Standard for reference and a real time clock to calculate kWh hrs.
  - I found it amazing to discover ANSI C12 does not present a "Gold Standard" reference for all meters to be compared to. For example your average meat market has a weight scale which is calibrated to a known standard such as weights in standard calibrated sizes for pounds and ounces. There is a seal affixed to that scale to assure the consumer they are not getting cheated. This characteristic does not exist in the ANSI C12 Standard.

AMI versus Analog Meter Accuracy

Key Differences

- *The ANSI C12 Standard - Real Time Clock*

  - There is no time standard reference in the ANSI C12 specification. In other words no “real time clock”. The analog meter did not need a clock; the gears in the meters did the calibrated settings to indicate kWh’s. This is extremely important because without a universal time standard, the AMI computer circuitry has no standard means to measure current consumption over a known reliable time period. So, how it calculates kWh measurements requires a very reliable and uniform time standard. In computer circuitry, a time synch process in the “stack” of processes is the least serviced characteristic leaving other more important computational process to have a higher priority. You may have had a home computer, which was not connected to the Internet where the indicated clock reading is off occasionally, with the time reading tending to drift a bit. The RF Emitting AMI meters have a means to keep the clock synced via the mesh network or cellular network. However, the Opt-Out AMI meter has no network connection so its clock will drift over time, which will affect the calculation of kWh’s. So, a consumer may not get the actual reading of the power they consumed. The Analog meter uses the gears to indicate the reading and does not drift, and therefore maintain accuracy.
  - If you have an AMI opt out program, you must use an analog meter to be accurate to the ANSI C12 standard.

AMI versus Analog Meter

Key Differences

- *The ANSI C12 Standard - Real Time Clock*

    - This is important to recognize because many utilities offer a Non – Communicating AMI meter. This has no real time clock reference. It will give erroneous readings as I have experienced.

    - Here is a photo of my meter installation. Note my calibrated analog meter is in series with my electronic AMI opt out meter. I read both meters every month at the same time and day of the month and compare them. I typically find the Electronic AMI is a higher reading than the Analog meter. I send these findings to the utility and they adjust my bill down to a matching reading. The utility now has given up any added charges of $10.00/month to my bill for manually reading my AMI meter.

Meter accuracy and your bill

- As professed by Landis+Gyr, their AMI meter is “accurate” based on the Navigant Consulting Report in 2010 and referenced their web site. However, within this report the extremely high rate of billing complaints after the installation of the new meters is evident and explanations were difficult to verify as to their cause. The number of complaints was dramatic. This baseline of complaints was done in Texas with real temperature ranges from ~30 to ~88 degrees.

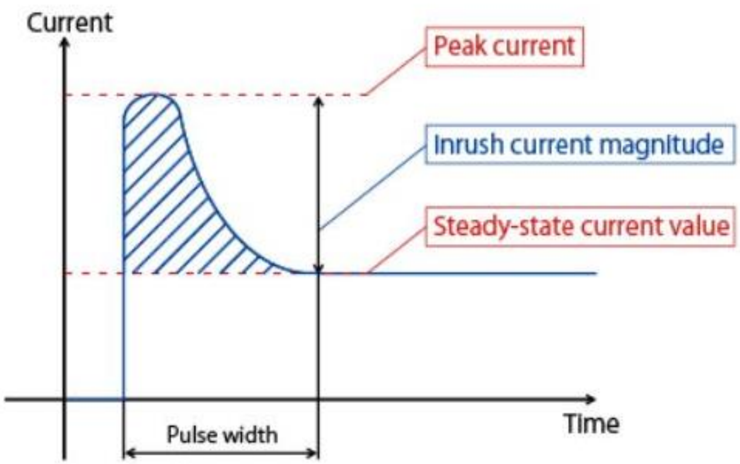
- Control testing conditions were not well explained in this report such as ambient temperatures ranges, and in particular the type of load the meter accuracy was compared to.

    - Resistive loads such as light bulbs with standard incandescent bulbs (linear loads), versus CFL’s, Halogen, Switched mode AC/DC power supplies i.e. Home phone chargers, TV and appliance controls, LED’s and overhead florescent light with electronic ballasts (non Linear loads).
    - Inductive loads such as electric motors in refrigerators, washing machines air conditioners etc.
    - No discussion on how the AMI meters did the kWh calculation, since it is really not a meter, but is a computer, with peak samples not averaged over a fixed period of time? **Whatever your peak use is in a 15 minute window is what you get charged for the full 15 minute window**.

- What is very different in the AMI meter is the algorithm used to calculate the readings from the sensor into the indicated display. The analog meter is a type of “totalizing” meter just like a gas pump. The AMI meter is very different, typically using peak use as a basis for calculations over a fixed window of time. (any peak in 15 minutes is used for billing the entire 15 minute window)
    - The AMI meter uses sensor data, which has to be averaged by a mathematical calculation, then registered into memory and on the LCD display.
    - The gas pump has a weights and measures standards sticker to assure the consumer they are getting what they paid for, there is no such concept on an AMI meter. ANSI standards are laboratory measurements under tightly controlled conditions and are inadequate for accounting for in the field variances for temperature and humidity.

Meter accuracy and your bill

- The Navigant Report tried to explain the billing inaccuracies in Texas using complex mathematic explanations and reference to “degree” days, but the degree variance was typically within 10% year over year, yet this did not explain power bills increasing as much as 25%-40% higher year over year.
- Their test lab control setups were done at room temperature as shown in pictures in the report.
- There was no field test at various temperatures for accuracy, nor was there a test using electric motors, they only lab tested with incandescent light bulbs, two completely different load variables.



Electric Motor Current Draws are different than a light bulb

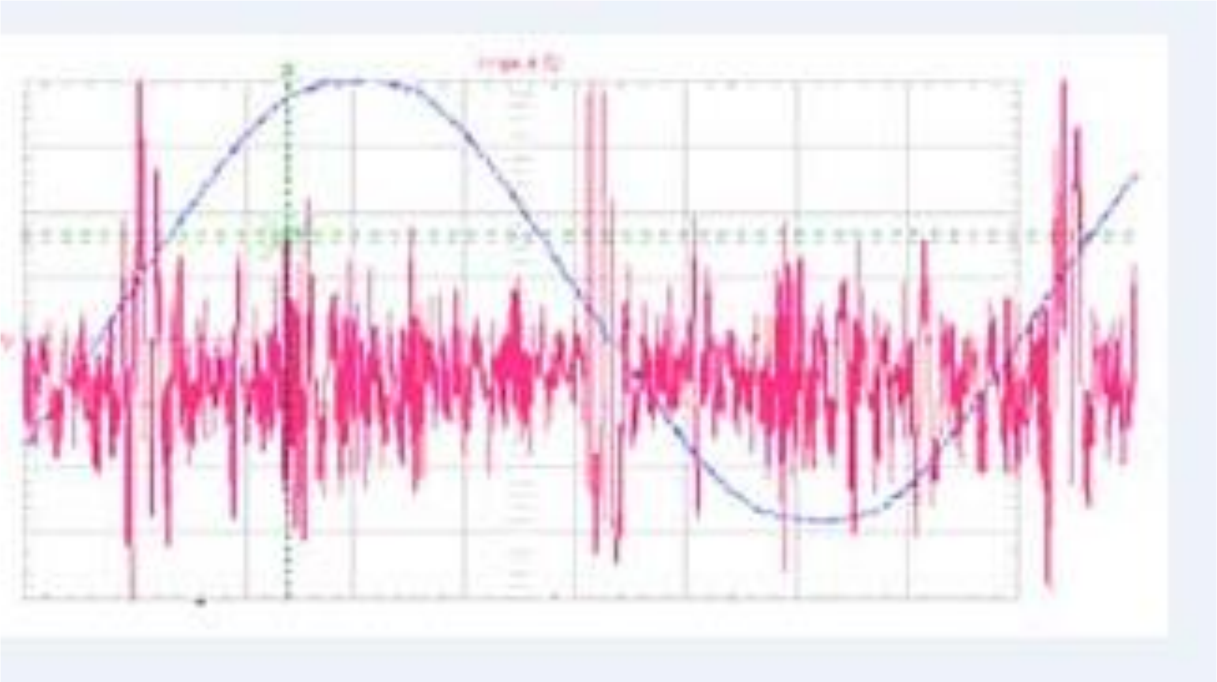
- There is a short .5 to .6 sec burst of current needed to start an electric motor, so a 5 amp rated motor may need 8-9 amps to get rotating up to rated speed.
- If the utility is measuring peak current and averaging this over a window of time you can skew the average when you combine the two types of loads.
- Only the utility knows the math in the software.
- If you have an “Energy Star” refrigerator/freezer, it starts and stops frequently, and so the skew of the average is worse, imagine the impact on the average reading after 3-5 motors start and stop in the sample window.

Conducted Emissions “on the wire”

- **US FCC Title 47 Part 15.109 and International Standard CIPSR 32 Conducted Emissions (EMC and EMI/RFI)**
  - **The AMI meter, Opt-Out Meter (no RF) and various versions of the Electronic meters all currently exhibit spiked high frequency voltage transients and magnetic common mode currents backwards onto the home wiring system creating a huge antenna amplifying these transients and magnetic currents.**
  - **There is no way to “fix” the current design without a direct connection to an Earth Ground source and a circuit redesign.**
  - **An external fix at your service panel costs anywhere from $2,000 to $7,000 for UL approved filters.**
  - **Customer appliances are breaking down, especially any appliance with an electric motor or critical electronics including pace makers, CPAP machines and other life sustaining medical equipment .**
  - **People are getting sick from the both RF generating and the Opt-Out meters as the result of conducted emissions and common mode currents.**

SMPS with Common Mode Filter – Principles You Need to Understand

The Standard Single Phase 60 Cycle/Second Waveform with EMI/RFI introduced by the SMPS



This waveform displayed is the same as an oscilloscope trace would look like, you cannot see this on a common voltmeter. Now we have introduced the effects of EMI/RFI via the SMPS to the same wire carrying the house current. This effect can be less depending on the environment, especially how good the house earth ground is magnetically coupling the house voltage currents Especially if they are using the water pipe as a ground reference which makes it worse. There are many variables that affect this waveform. The image in red should never be there, I have found this pattern consistent with every AMI meter, including the AMI meter with the radios off and the various digital meter alternatives. It is typically not compliant to FCC rules over all required frequencies for “conducted” Emissions Class A or Class B.

The claim the meter meets FCC specs, maybe not true

Here is an example:
This the section of a report on a Sensus brand meter that is non compliant at 300 KHz note they are over spec for both FCC QP and AV Class B specs

I have the full reports of each example I present here. These are the parameters for "Conducted Emissions" not the RF 900 MHz transmissions

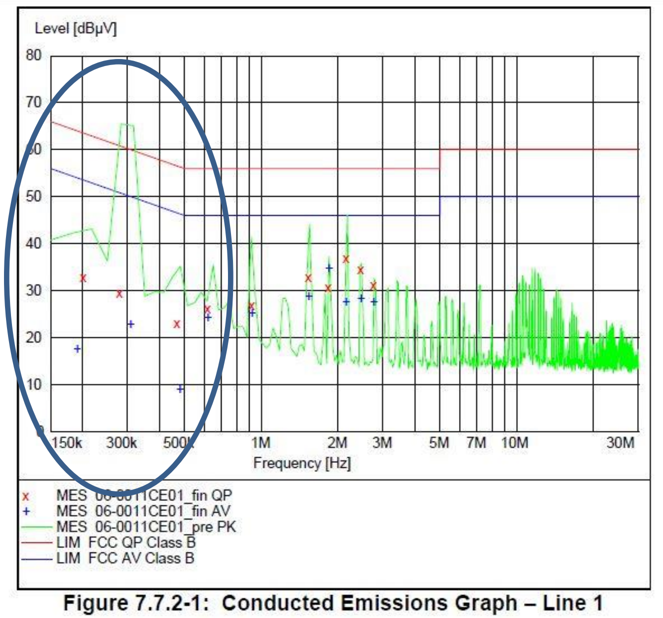


Figure 7.7.2-1: Conducted Emissions Graph – Line 1

How does the utility get a non-compliant meter accepted as compliant?

Here is an second example:
The previous section of a report on the same Sensus brand meter that is non compliant at 300 KHz where they are over spec for both FCC QP and AV Class B spec. They then submitted a second report to the Iowa Commission for the same meter a report that obviously “Cherry Picks” the data points avoiding the 300-320 KHz frequency range to make it appear to be compliant. They avoided the graph shown in the previous chart. I find this be a common ploy in submission for approvals to state commissions. Since the meter companies pay the certification service they can be easily influenced to create a report favorable to outcome the meter company desires.

Zigbee, S/N 33 065 394

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
2.064750	---	15.19	46.00	30.81	1000.0	9.000	L1	OFF	9.8
2.064750	27.11	---	56.00	28.89	1000.0	9.000	L1	OFF	9.8
2.154750	---	12.94	46.00	33.06	1000.0	9.000	L1	OFF	9.8
2.154750	24.10	---	56.00	31.90	1000.0	9.000	L1	OFF	9.8
2.699250	---	11.95	46.00	34.05	1000.0	9.000	L1	OFF	9.8
2.699250	21.12	---	56.00	34.88	1000.0	9.000	L1	OFF	9.8
13.697250	---	21.20	50.00	28.80	1000.0	9.000	L1	OFF	10.4
13.697250	26.80	---	60.00	33.20	1000.0	9.000	L1	OFF	10.4
14.320500	---	25.23	50.00	24.77	1000.0	9.000	L1	OFF	10.4
14.320500	30.20	---	60.00	29.80	1000.0	9.000	L1	OFF	10.4
15.987750	---	17.86	50.00	32.14	1000.0	9.000	L1	OFF	10.6
15.987750	28.04	---	60.00	31.96	1000.0	9.000	L1	OFF	10.6

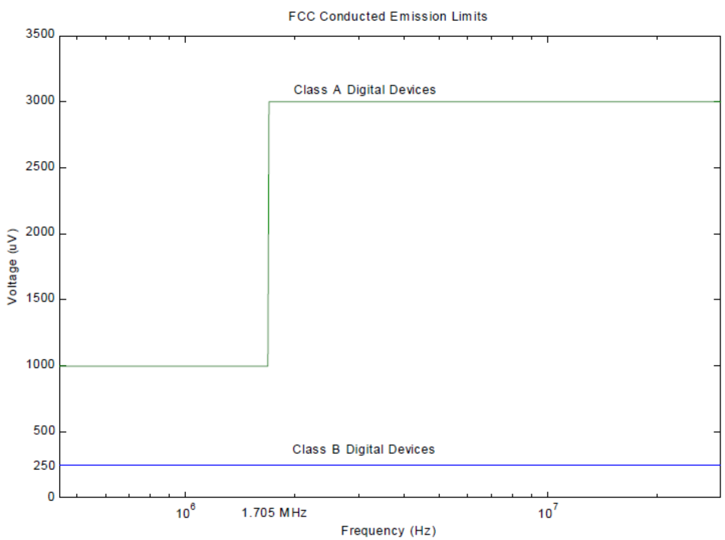
Line 1: AC Mains

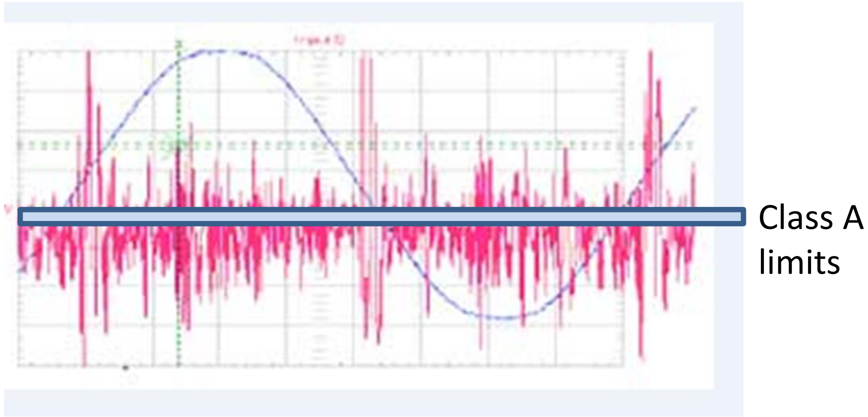
Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.357000	---	17.60	48.60	31.00	1000.0	9.000	N	OFF	9.7
0.357000	26.57	---	58.63	32.06	1000.0	9.000	N	OFF	9.7
0.379500	---	15.99	48.12	32.13	1000.0	9.000	N	OFF	9.7
0.379500	24.34	---	58.15	33.81	1000.0	9.000	N	OFF	9.7
0.640500	---	13.72	46.00	32.28	1000.0	9.000	N	OFF	9.7
0.640500	23.18	---	56.00	32.82	1000.0	9.000	N	OFF	9.7
1.329000	---	17.67	46.00	28.33	1000.0	9.000	N	OFF	9.8
1.329000	25.90	---	56.00	30.10	1000.0	9.000	N	OFF	9.8
2.064750	---	17.08	46.00	28.92	1000.0	9.000	N	OFF	9.8
2.064750	27.38	---	56.00	28.62	1000.0	9.000	N	OFF	9.8
2.103000	---	16.52	46.00	29.48	1000.0	9.000	N	OFF	9.8
2.103000	26.25	---	56.00	29.75	1000.0	9.000	N	OFF	9.8

Neutral: AC Main

AMI meter without Common Mode Filter – Principles You Need to Understand

The Standard Single Phase 60 Cycle/Second Waveform with EMI/RFI introduced by the SMPS





The image in red is for both AMI meters (with the radios on or off) and the various forms of “Electronic Meters." They are not compliant to FCC rules for “conducted” Emissions Class A or Class B. Shown here are the limits for CONDUCTED emissions not Radio Emissions, which is a different specification, which are being fed back into the home wiring at the load panel. This is placing stress on all electronics and electric motors in the home, causing early appliance motor failures, appliance electronic control failures and radio interference, in addition to health effects such as insomnia, tinnitus, headaches, high blood sugar levels and nervous disorders such as neuropathy and heart arrhythmia. In order to become compliant the meter manufactures would have to scrap the current SMPS design, and include one that connects to an earth ground path to sink the oscillations to the home ground rod.

What can be done to remove conducted emissions within the meter?

- A complete redesign of the SMPS board to include UL and FCC specifications for "conducted" emissions of EMC/EMI/RFI and stray common mode magnetic currents.
- Inclusion of common mode filter components.
- Inclusion of a direct connection to an Earth Ground to “Sink” the Conducted Emissions directly to ground.

Summary