FCC Rules for Part 15
Smart Meter Digital Devices

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FCC RULES FOR SMART METERS

AMI digital smart meters:

- Are an FCC part 15 class B digital device
- Have FCC rules to govern its operation in the Code of Federal Regulation in *47 CFR 15*
- Use **unlicensed** Wi-Fi spectrum operating in the free use Wi-Fi range
  - 900 Mhz
  - 2.4 GHz
- Emits RF radiation AND incidental noise ("dirty electricity")
- **Dirty electricity (DE) conducted emissions (2 kHz- 50 Khz) exist partially in the normal range of hearing (20 Hz – 20 KHz)**

FCC RULES IN NON-COMPLIANCE

Incidental noise and its potential by-product of harmful interference are legal terms defined in *47 CFR 15.3* under these 2 rules FCC rules:

- **Incidental radiator** *(47 CFR 15.3(n)):* "A device that generates radio frequency energy during the course of its operation although the device is not intentionally designed to generate or emit radio frequency energy. Examples of incidental radiators are dc motors, mechanical light switches, etc." and is a by-product of the radiation that might cause interference

- **Harmful interference** *(47 CFR 15.3 (m)*): "Any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this chapter."

https://ecfr.io/Title-47/Section-15.3#:~:text=%28n%29%20Incidental%20radiator.%20A%20device%20that%20generates%20radio,motors%2C%20mechanical%20light%20switches%2C%20etc.%20%28o%29%20Intentional%20radiator.

FCC RULES IN NON-COMPLIANCE

https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15/subpart-A/section-15.5

Smart meters are an FCC part 15 Class B device that operates under these 2 general rules of *47 CFR 15.5* which states:

- **No harmful interference is permitted per *47 CFR 15.5 (b)*.** "Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that **no harmful interference is caused a**nd that **interference must be accepted** that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator."

- **Harmful interference must be remedied or operations ceased *47 CFR 15.5 (c)*.** "If there is harmful interference the user must stop operation and remedy the interference. The operator of a radio frequency device **shall be required to cease operating the device** upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected."

FCC RULE 47 CFR 15.3

Https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15/subpart-A/section-15.13

- "Manufacturers and importers should use good engineering practices (GEP) before they market and sell these products, to minimize possible interference" (47 CFR 15.13).

- What are good engineering practices that should have been built into the smart meter design and which parts were overlooked or omitted of any review after finding they were problematic?

WHAT IS GEP?

https://site.ieee.org/ias-icps/files/2016/11/IEEE-IAS-P3001.2_D4-markup-File-16-121.pdf

Power industry is not sufficiently protecting customers against electrical anomalies resulting from impacts to their distribution or transmission systems.

- Smart meters lack " Safety by Design"
- Here is what IEEE recommends for GEP for the power industry
  - Motor control and protection (customer responsibility)
  - Undervoltage protection
  - Phase protection
  - Arc flash and or other protection that enhances maintenance and operational safety

WHAT IS GEP?

GEP #1: Motor control and protection

- Smart meter utility tariffs usually state that they assume no responsibility for failures, equipment, or operations due to use of the electrical energy.

- The utility requirements specify **that customers are responsible** for equipping motor controllers with protection.

- **What does your utility tariff say, do you even know?**

WHAT IS GEP?

GEP #2: Undervoltage protection

- Tripping devices to prevent sustained under-voltage operation. The under-voltage protection should be of a time delay type to avoid unnecessary tripping during momentary disturbances or service interruptions.

GEP #3: Phase protection:

- Tripping devices to switch off motor controllers as protection from single phasing, improper rotation due to phasing, and overheating due to current unbalance.

WHAT IS GEP?

GEP #4: Arc flash and or other protection that enhances maintenance and operational safety

- Protection to mitigate electrical hazards may be more than that required to meet the minimum requirement of installation codes, how it should be considered within the context of **safety-by-design** principles and the hierarchy of hazard control measures provided in NFPA 70E and ANSI Z10.

NO SAFETY BY DESIGN

Protective electrical safety devices absent from smart meter system network installations, examples:

- Dirty electricity filters to mitigate incidental noise from the internal switch mode power supply
- Whole utility meter surge protectors
- RF shielded fixed wiring and hardened electrical components upstream and in the meter
- No protection against RF microwave heating that destroys the insulating characteristics of fixed electrical wiring over time 24/7 that may result in smart meter caused fires in the electrical wiring
- RF heating may also take out consumer owned electrical devices and appliances, etc.

NO SAFETY BY DESIGN

- Https://www.icnirp.org/cms/upload/publications/ICNIRPLFgdl.pdf

- **ICNIRP GUIDELINES FOR LIMITING EXPOSURE TO TIME-VARYING ELECTRIC AND MAGNETIC FIELDS (1HZ – 100 kHZ)**

- **INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION SELF ADMITS ADVERSE NEURAL AND MUSCULAR STIMULATION FROM THESE FREQUENCIES THAT OCCUR WITH DIRTY ELECTRICTY**

PUBLIC HEALTH AND SAFETY HAZARD

Https://www.cisa.gov/sites/default/files/publications/safecom-ncswic_rf_interference_best_practices_guidebook_2.7.20_-_final_508c.pdf

RF Interference Mitigation Lifecycle

The RF interference mitigation cycle includes five steps: Recognize, Respond, Report, Resolve, and Resilience. In order to robustly defend against RF interference, public safety organizations must employ these steps continuously. It is also recommended that organizations consider sharing information on RF interference with neighboring jurisdictions to further increase resiliency.

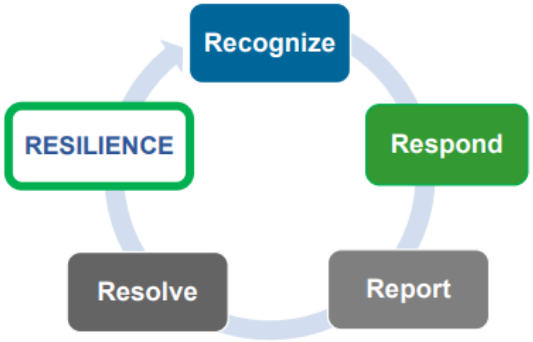

Figure 2. RF Interference Mitigation Lifecycle

Recognize

Figure 3. How to Mitigate RF Interference - Recognize

Although public safety agencies may attribute equipment failure to normal wear or general malfunctioning, disruptions in communications may result from internal or external RF interference. Per the above figure from S&T,[40] identifying the source of the RF interference is a crucial step to mitigating issues and regaining communications capabilities.