

GE Digital Energy

GE Smart Meters: *Technology Overview*

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imagination at work

Digital Energy business overview

Smart Grid

Overcoming power challenges to re-energize our planet's energy infrastructure to handle demand the next 100 years

- Metering & Sensing Sys
- Grid Automation
- Smart Grid Solutions



Power Equipment

Technology to ensure superior performance, accurate sensing, and industry leading energy efficiency

- Power Quality
- Power Delivery
- Power Sensing



Prolec GE JV

A reliable line of residential, commercial, and industrial transformers

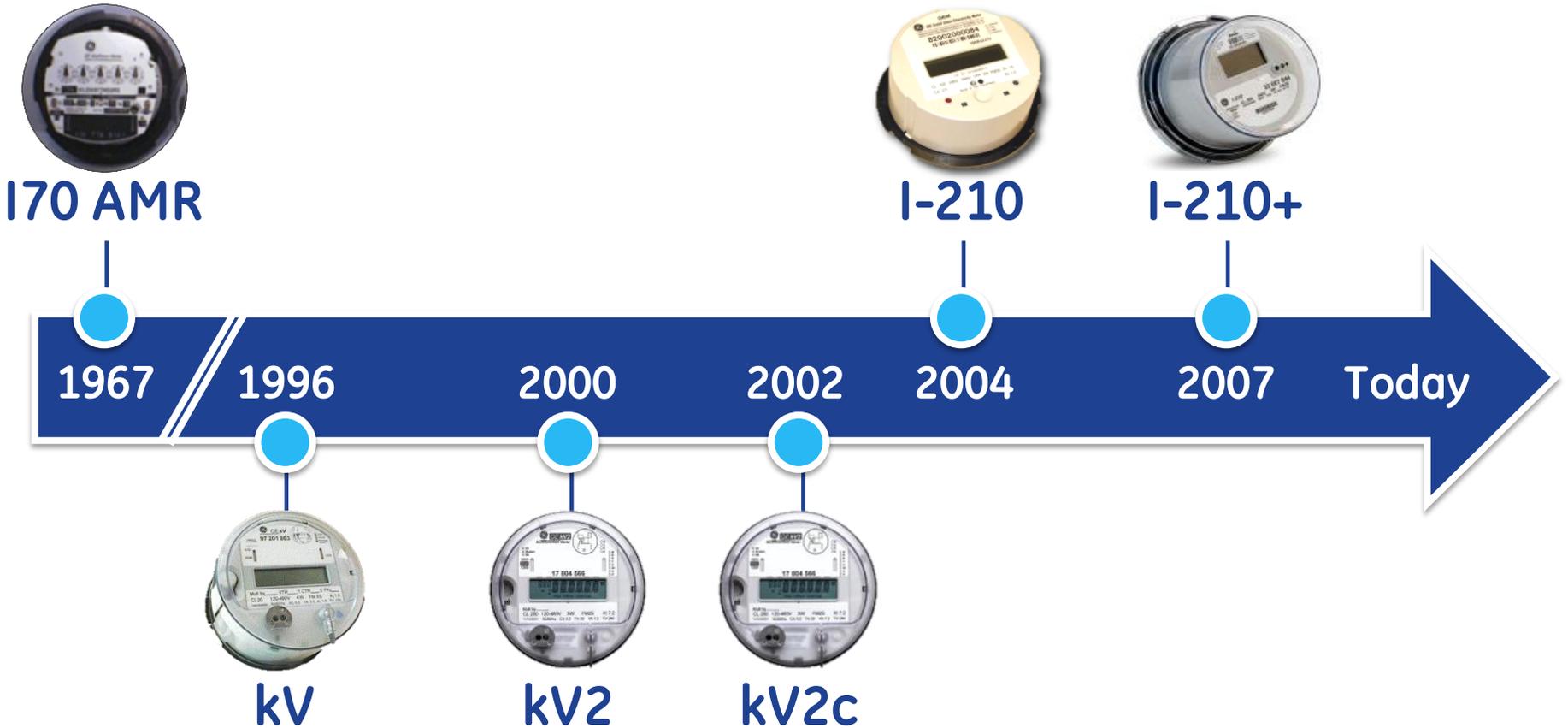
- Power Transformers
- Distribution Transformers
- Autotransformers/Shunts



End-to-end technology and expertise to build a smarter grid

GE metering technology evolution

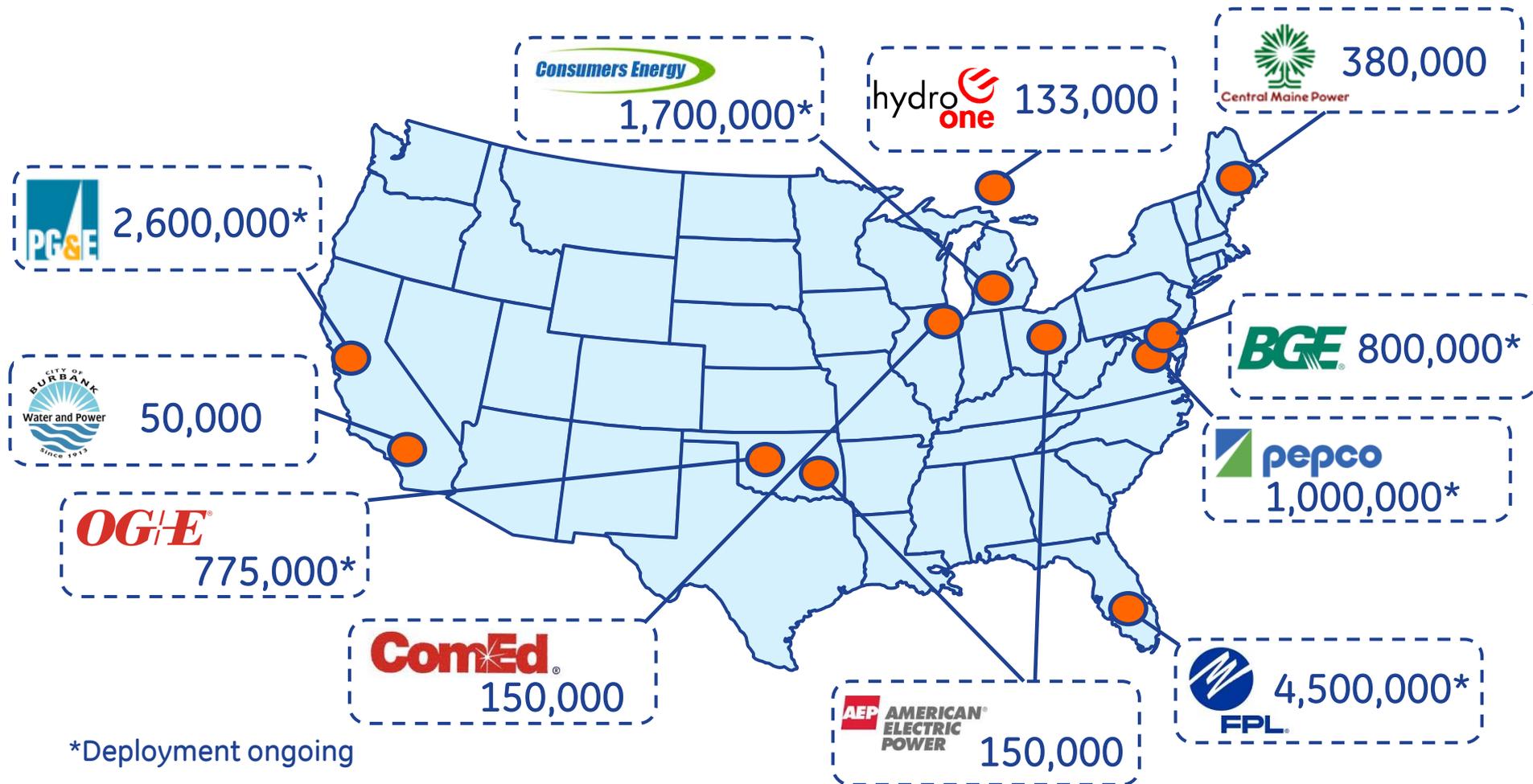
ANSI Single Phase Meter



ANSI Poly Phase Meter



GE's growing smart meter footprint

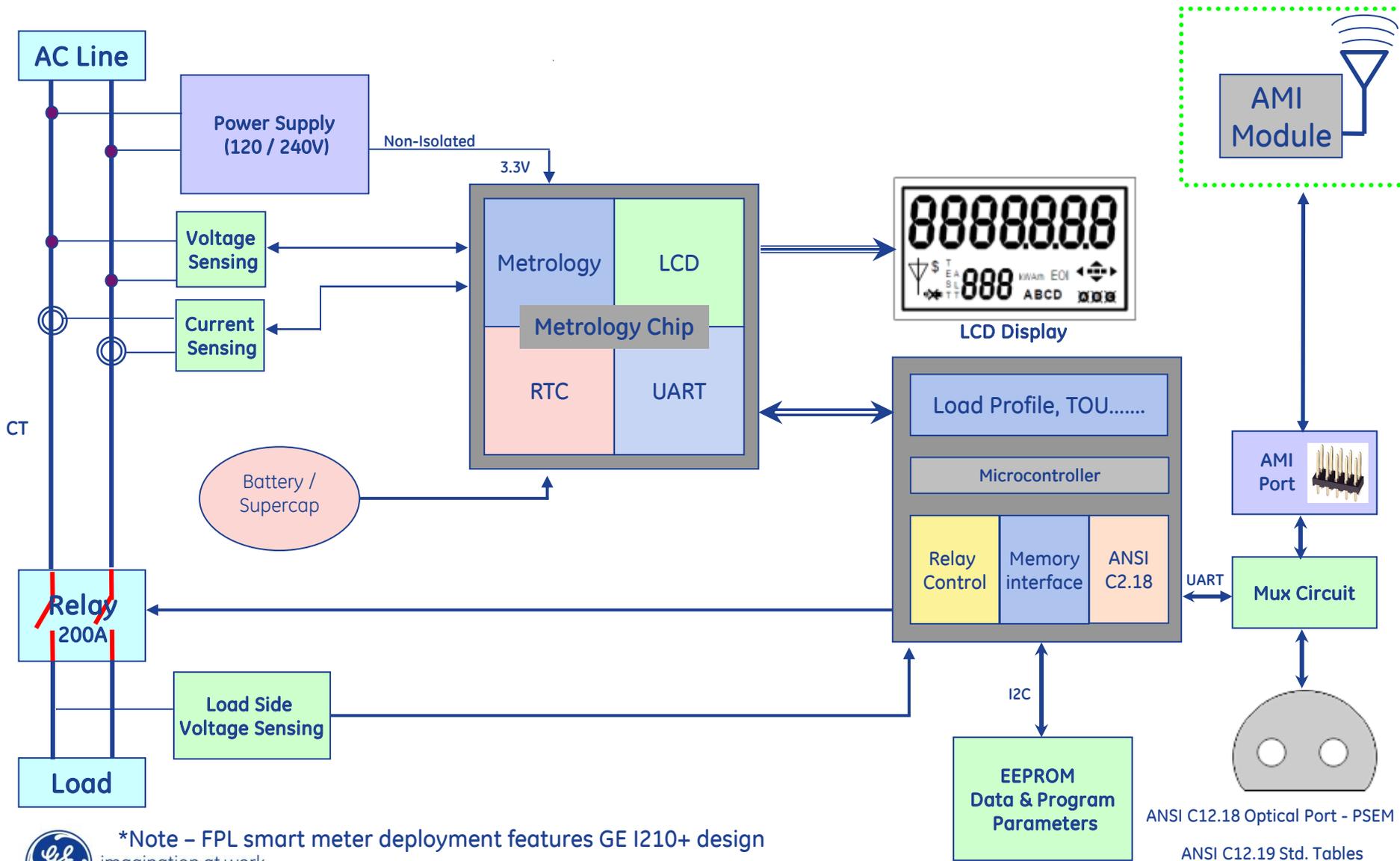


Wide deployment of proven technology

Smart meter components & functions



I210+c smart meter architecture*



*Note - FPL smart meter deployment features GE I210+ design
imagination at work

ANSI C12.18 Optical Port - PSEM
ANSI C12.19 Std. Tables

Smart meter data flows

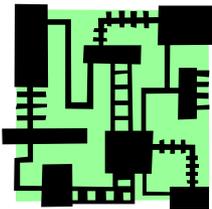
Collection
(1 second)

Storage
(1-60 min)

Communication
(60 seconds)

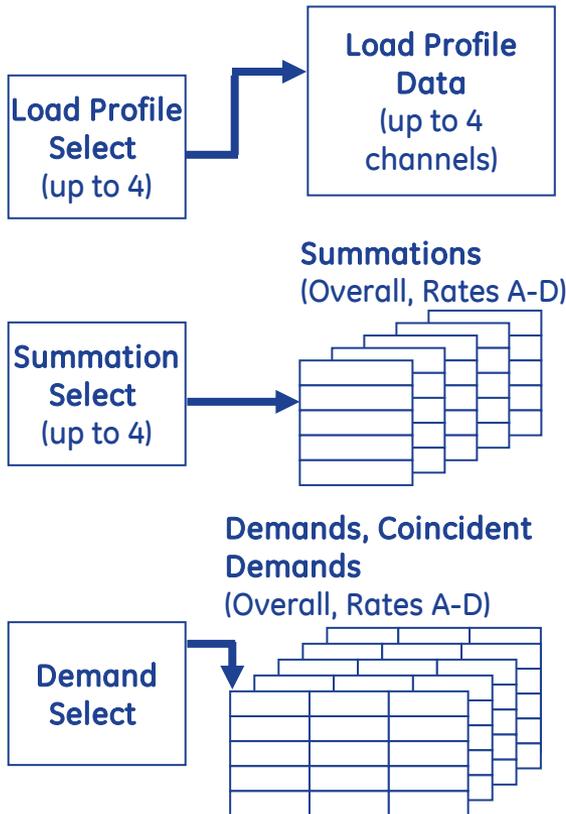
Transmission
(Daily)

Metrology

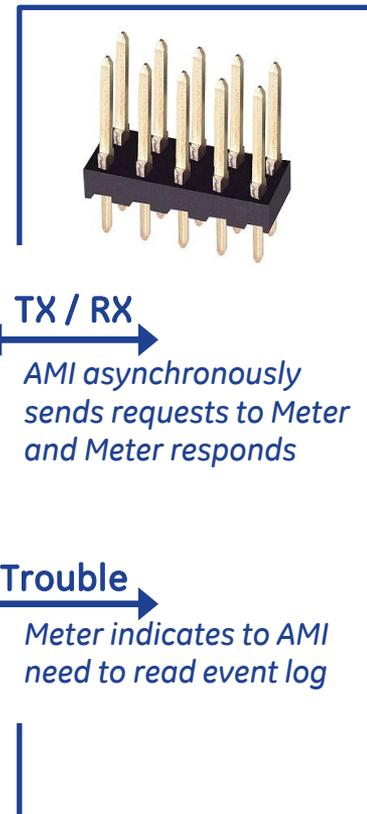


- ✓ Watt-hours
- ✓ VAR-hours
- ✓ VA-hours
- ✓ Voltages
- ✓ Currents
- ✓ Frequency
- ✓ Temperature

Calculations



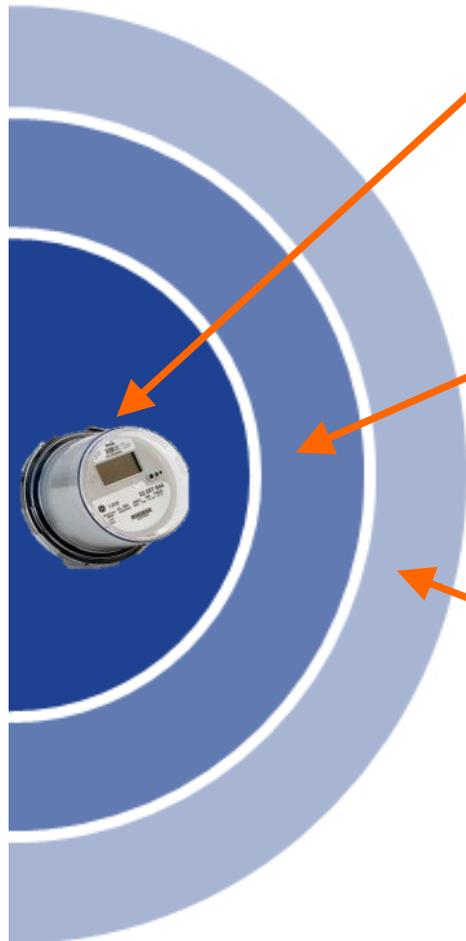
AMI-Meter Interface



Backhaul



Meter security... a layered approach



Industry Standards

- GE smart meters conform to ANSI C12.18 protocol
- Optical port designed to not allow access to the AMI network

Testing & Validation

- Independent cyber security assessment conducted by internationally recognized 3rd-party
- Recommendations incorporated into product development lifecycle

Monitoring & Response

- Embedded metering technology supports comprehensive self-diagnostic functions
- Enables immediate detection and reporting of tampering, fraud, or irregular operation

A closer look at meter safety

Common concerns and mitigating measures

Physical

“Hot socket” event

- Meters designed and tested to perform to industry standards
 - ✓ ANSI C12.1 (i.e., temperature rise, insulation)
 - ✓ IEC 60695-2 (heat and flame tests)
 - ✓ UL 94 (flammability ratings)

Over-voltage event

- Meters designed to over-voltage industry performance standard (ANSI C12.20)
 - ✓ Withstand sustained over-voltage of +20%
 - ✓ Withstand temporary overloads to 12 kA
 - ✓ Withstand surge up to 6kV

Proven performance

Environmental / RF

AMI network interface

- Smart meters emit RF emissions during the transmission of data across AMI network
- AMI radios comply with FCC limits on RF emissions (FCC 47 CFR 15 Class B limits)
- Annual RF emissions from a 15-min daily cell phone call = 375 years of RF emissions from a smart meter in normal operating mode¹

Switching Mode Power Supply

- SMPS used in smart meters and other modern electronics for efficient power conversion
- GE smart meters utilize filtering device to minimize SMPS RF emissions and comply with FCC limits

Demonstrated compliance



End