

New York State Public Service Commission

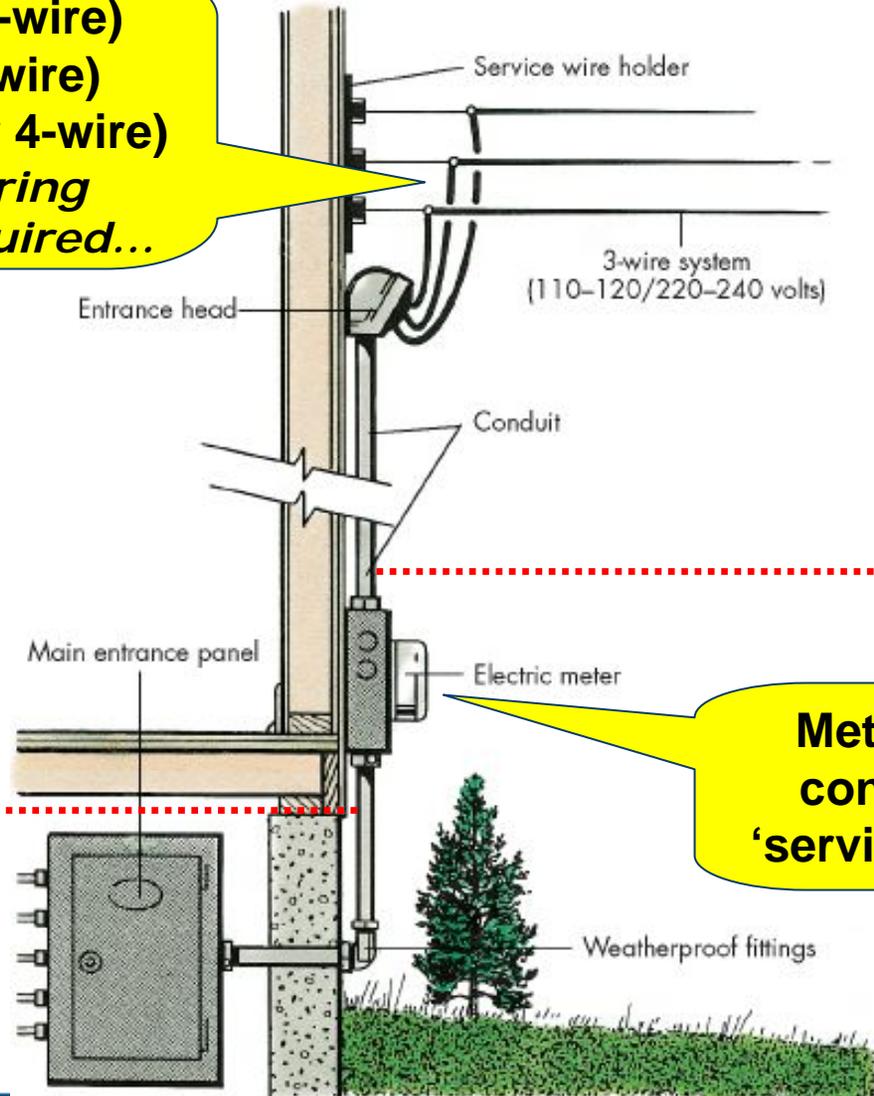
Meter Workshop Panel

April 15, 2008

Metering Overview

Metering Overview

Single Phase (2-wire)
Two-Phase (3-wire)
Three-Phase (3 or 4-wire)
*various metering
"forms" are required...*



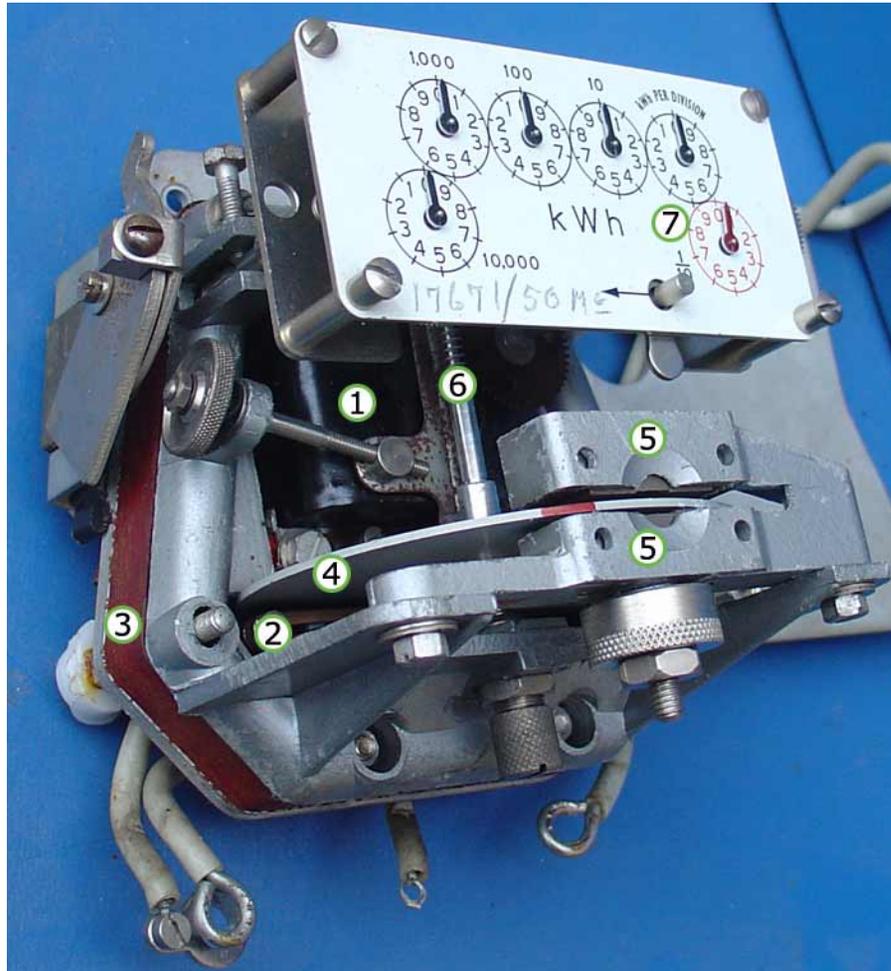
Line Side
(utility)

Load Side
(customer)

Meter as the point of
connection between
'service' and 'consumer'



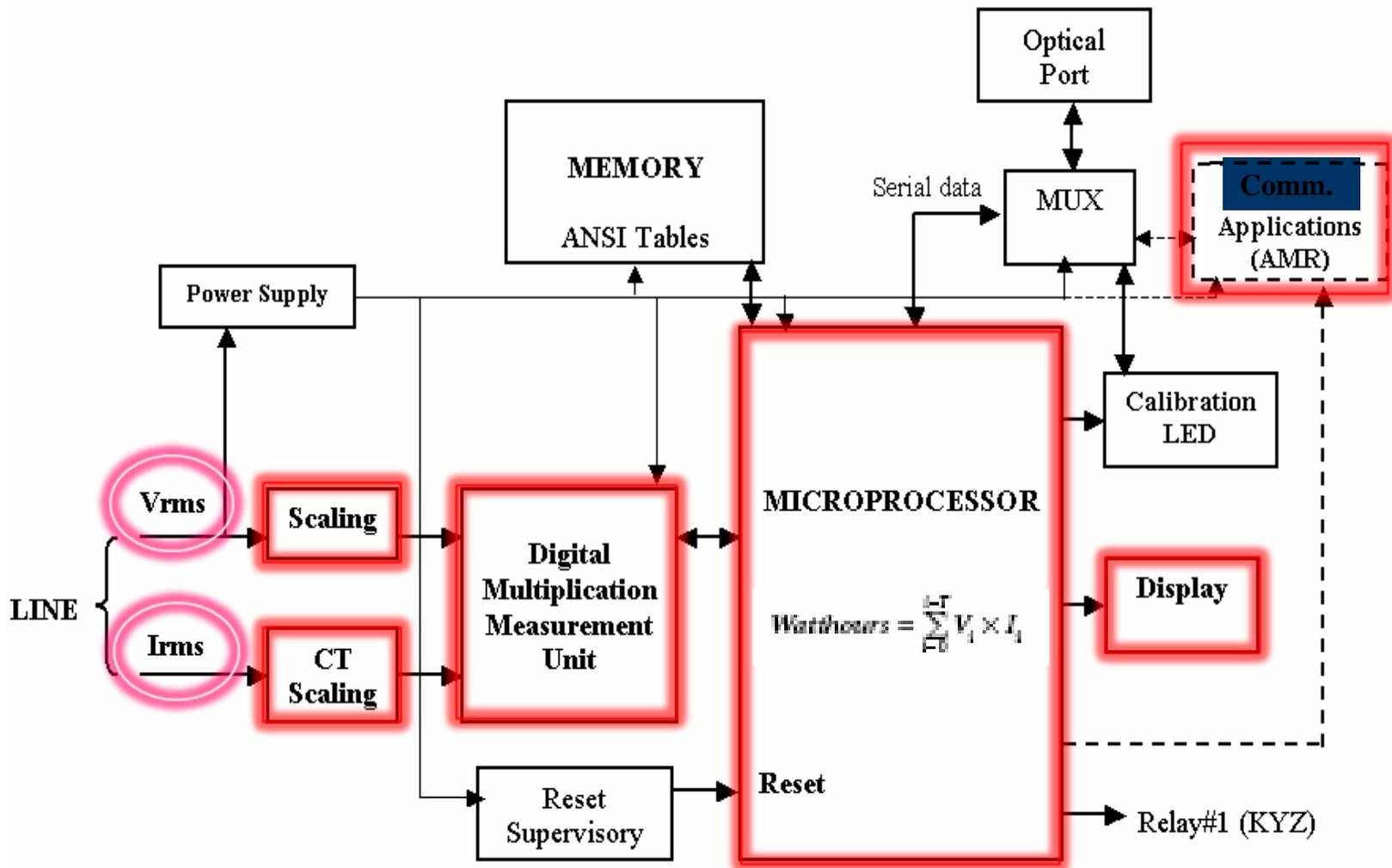
Electromechanical Meters



Mechanism of electromechanical induction meter. (1) - Voltage coil - many turns of fine wire encased in plastic, connected in parallel with load. (2) - Current coil - three turns of thick wire, connected in series with load. (3) - Stator - concentrates and confines magnetic field. (4) - Aluminum rotor disc. (5) - rotor brake magnets. (6) - spindle with worm gear. (7) - display dials - note that the 1/10, 10 and 1000 dials rotate clockwise while the 1, 100 and 10000 dials rotate counter-clockwise.

Principle: rotation of an **aluminum disk** based on the interaction between two magnetic fields caused by the voltage and current

Solid State Metering Principle



Measurement of samples of voltage and current (e.g. 100 sample/sec), followed by calculation of registers such as energy and demand





Advantages of Solid State Meters

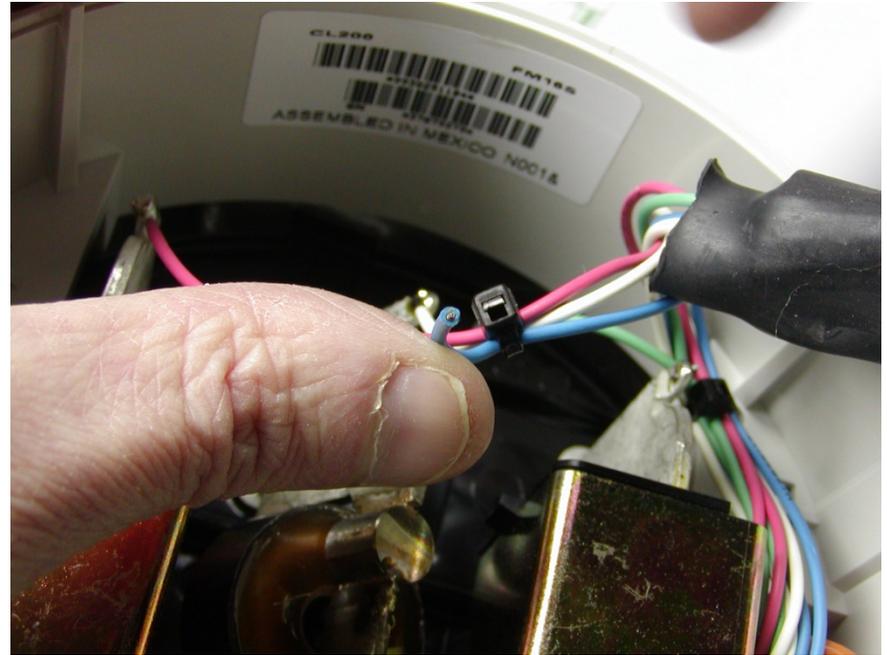
- Better accuracy (0.1 - 0.5 vs. 1.0 - 2.0)
- Consistent accuracy under varying voltage, load, temperature, PF, frequency... [ANSI C12.20]
- More parameters/data to measure and display
- Less manufacturing cost
- Ease of handling (light, programmable...)
- Advanced communication methods
- Options such as Load Profile, interval data, net metering...

Tampering Attempt...

from...



to:



Solid state meters can report irregular conditions such as:
Lost of one phase, opening the cover, reverse current, meter powered down,
attempt to reprogram, attempt to access with wrong password...



Solid-State Residential Meters



**Itron
Centron**



**L+G
Focus**



**GE
I-210**



**Sensus
iCon**



C&I (Polyphase) Meters



GE kv2c



Itron:

Vectron



Sentinel



Centron-Poly



**ABB
Alpha-Plus**



**Elster
A3-Alpha**



**Landis+Gyr
S4e**

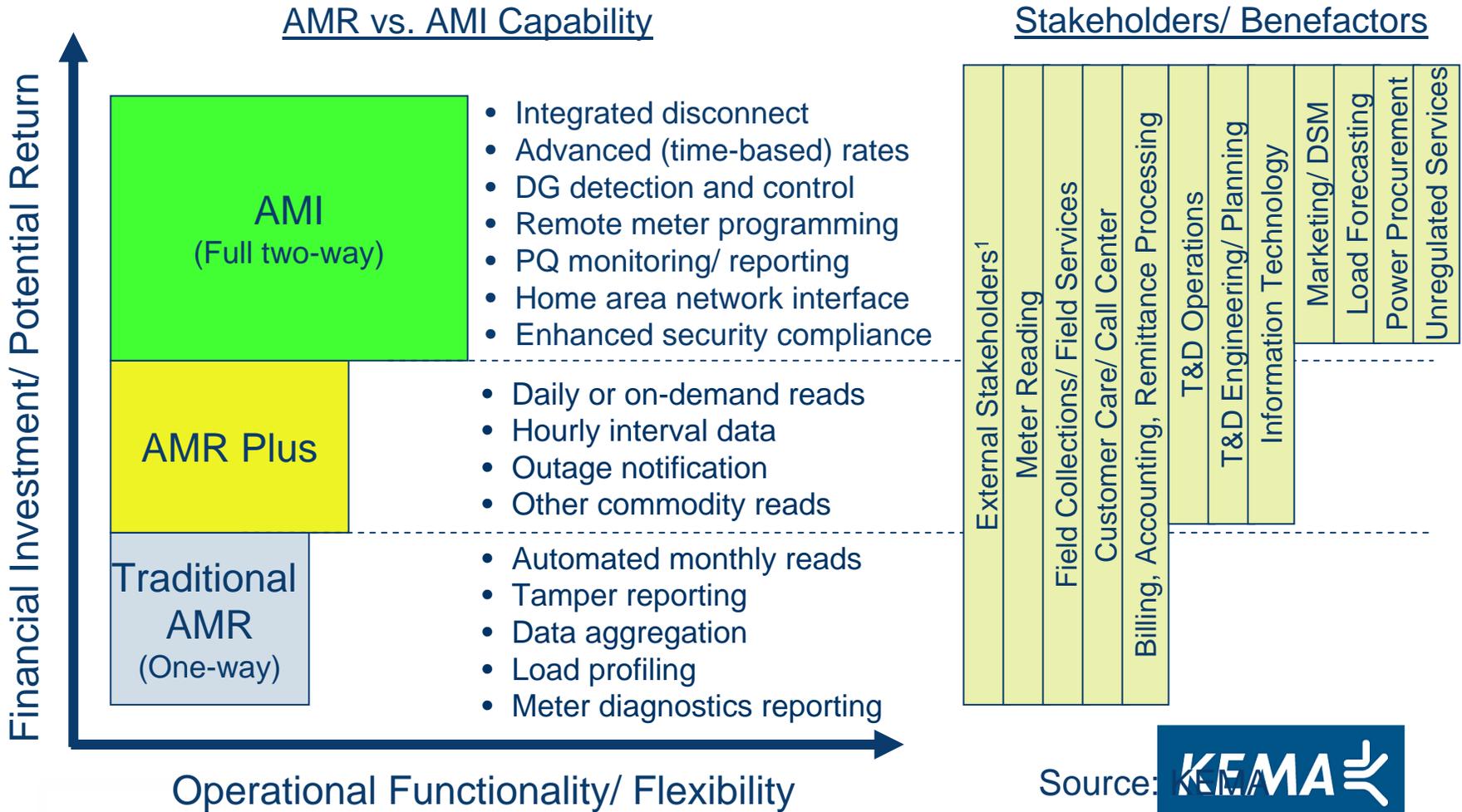


**Sensus
iCon-APX**

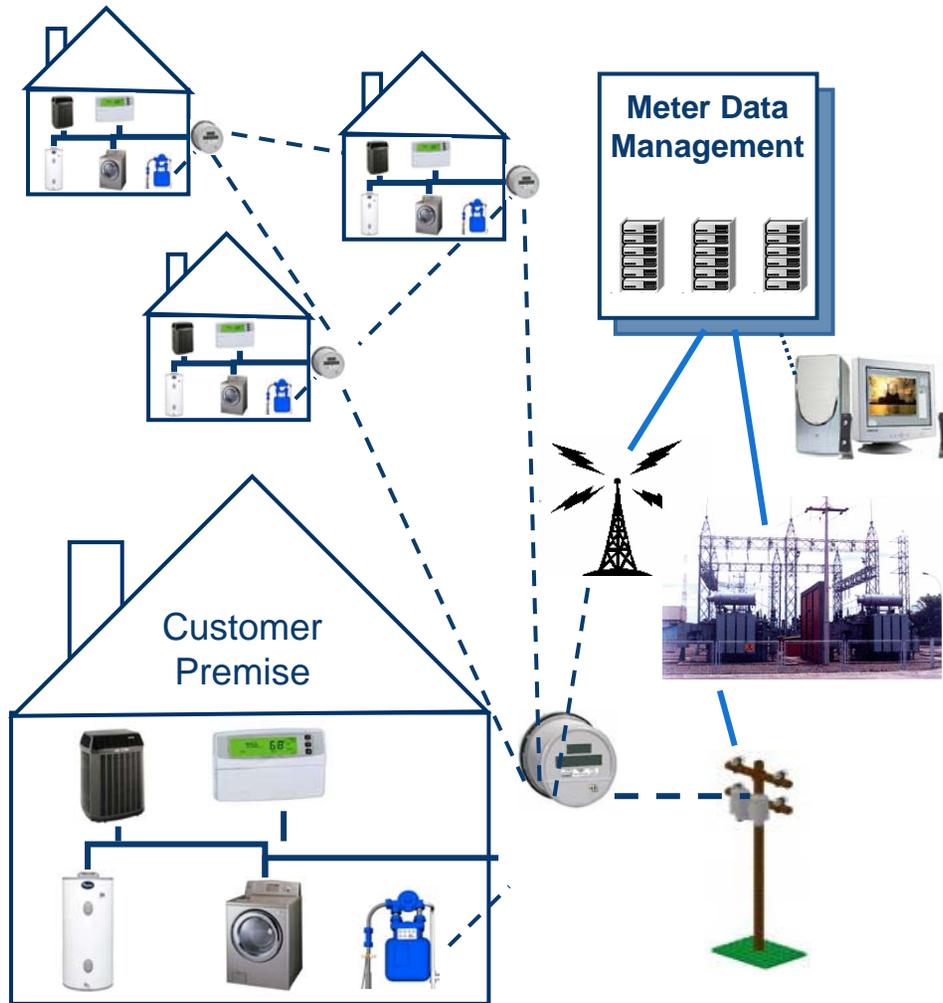


Metering AMR/AMR+ and AMI

AMI/AMR+/AMI Delineation



Future State



- Meter technology includes:
 - Interval watt-hour recording
 - Interfaces to site devices including home networks, water meters, and controllable devices
 - Solid-state 200 A disconnect switches
 - Power outage notification
 - Tamper and theft notification
 - Bi-directional metering

The Panel of Experts

Arun Seghal

Itron

Ed Grey

Elster

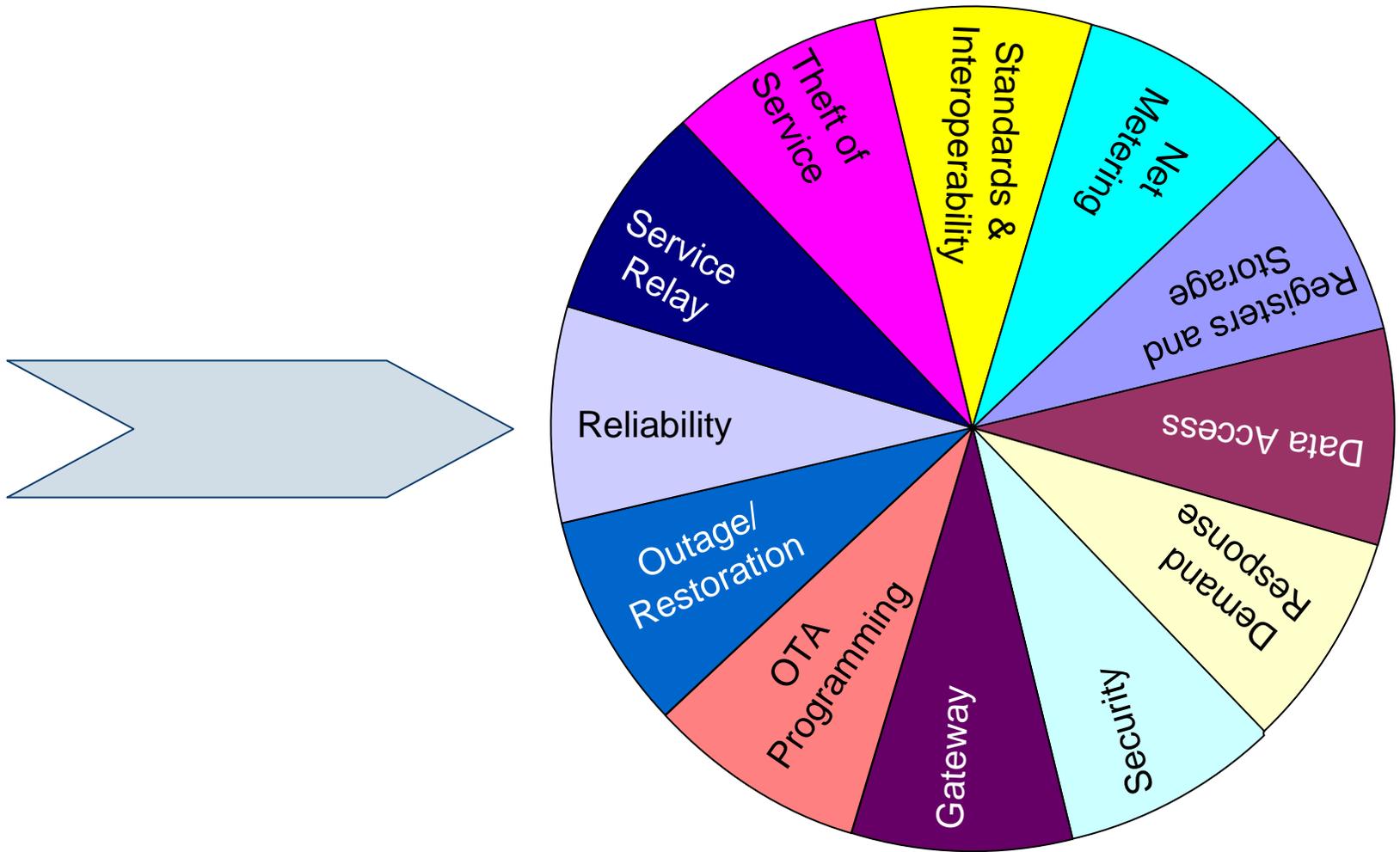
Marc Lipski

Landis + Gyr

Mak Tarnoff

GE

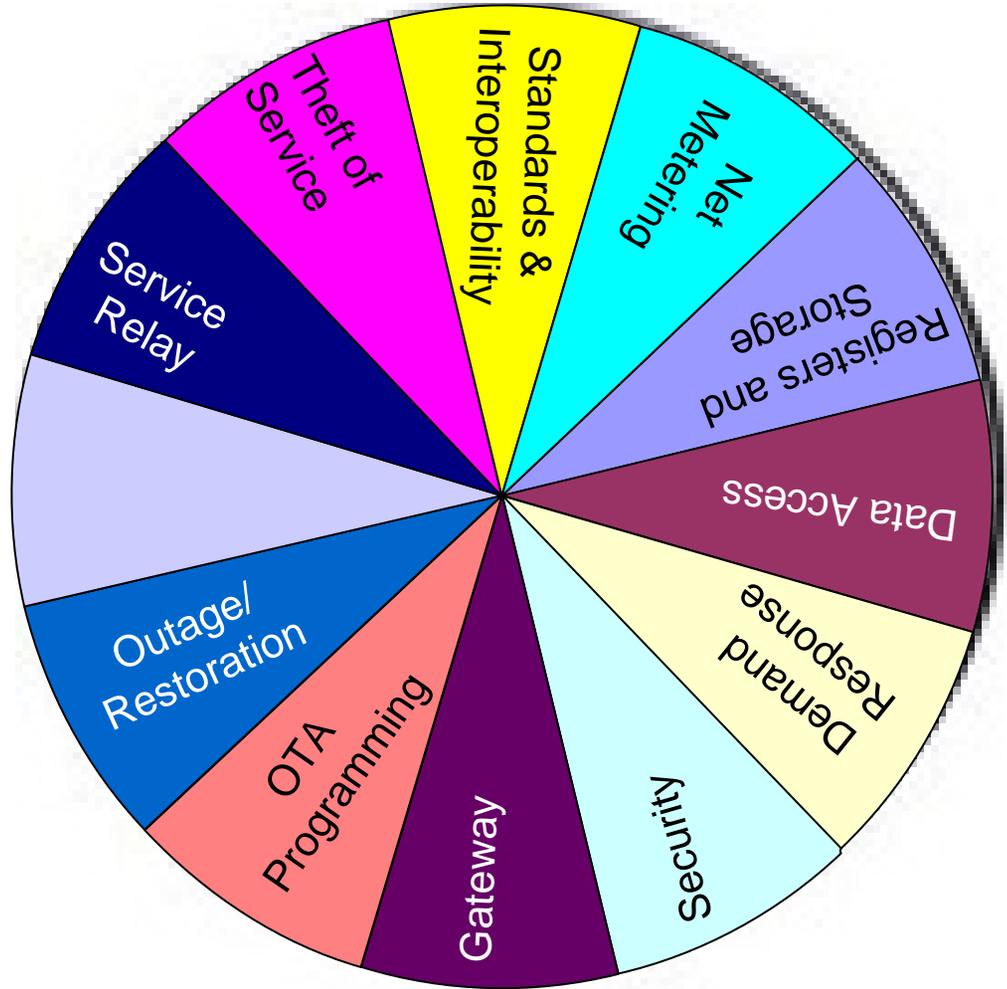
The Question Wheel



Prepared Question #1

Reliability

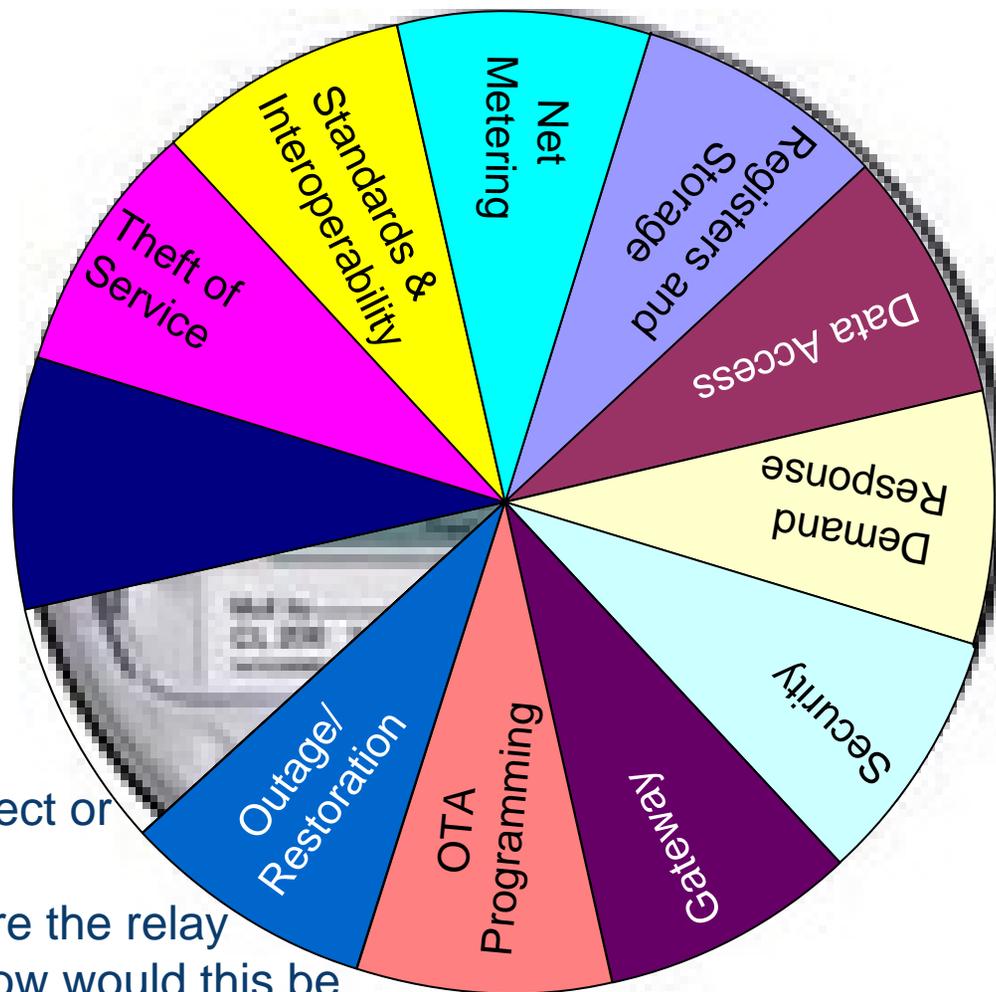
What should be the minimum meter in-service life? How is it measured or calculated and what is the greatest vulnerability or risk that contributes to this?



Prepared Question #2

Service Relay

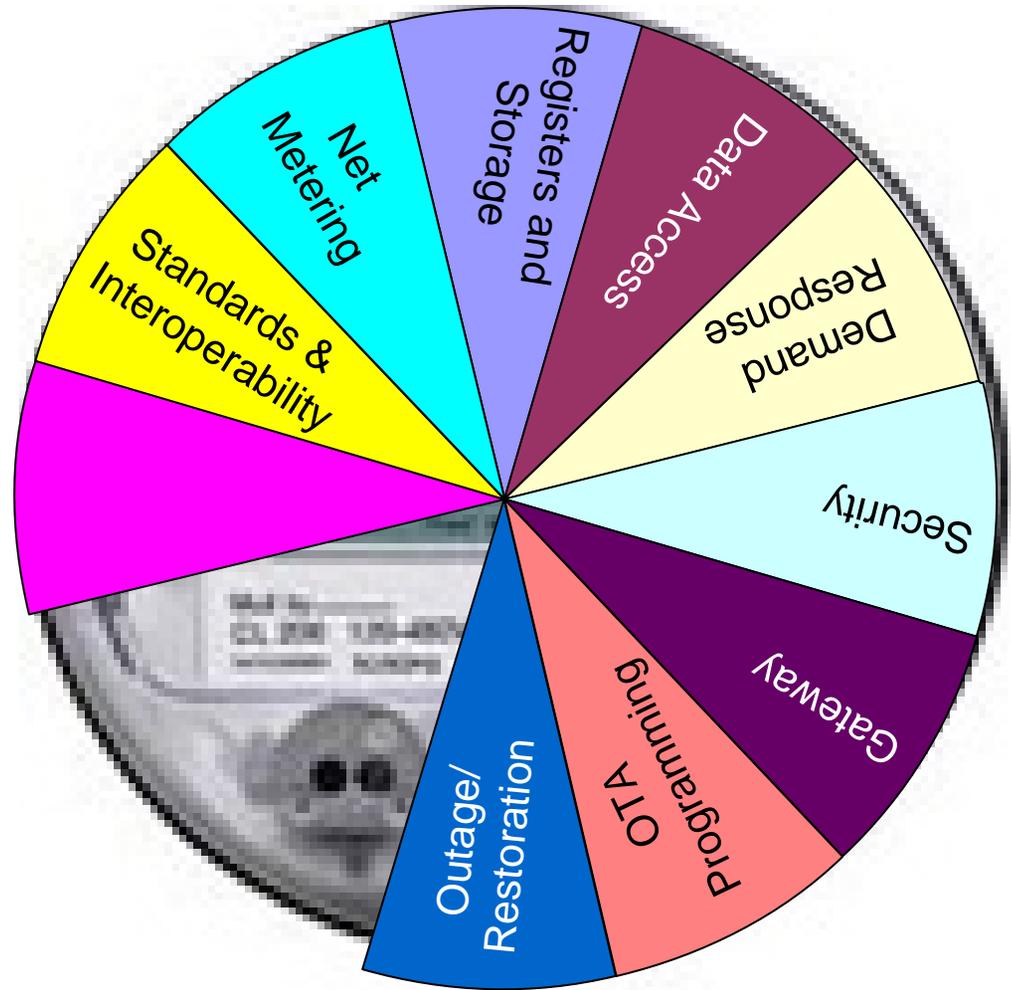
What is the percentage of cost increase to a residential meter to include the service (disconnect or load limiting) relay. There are anticipated programs that where the relay will be used for load limiting, how would this be accomplished? What are the limitations of this relay and what are the resulting implications?



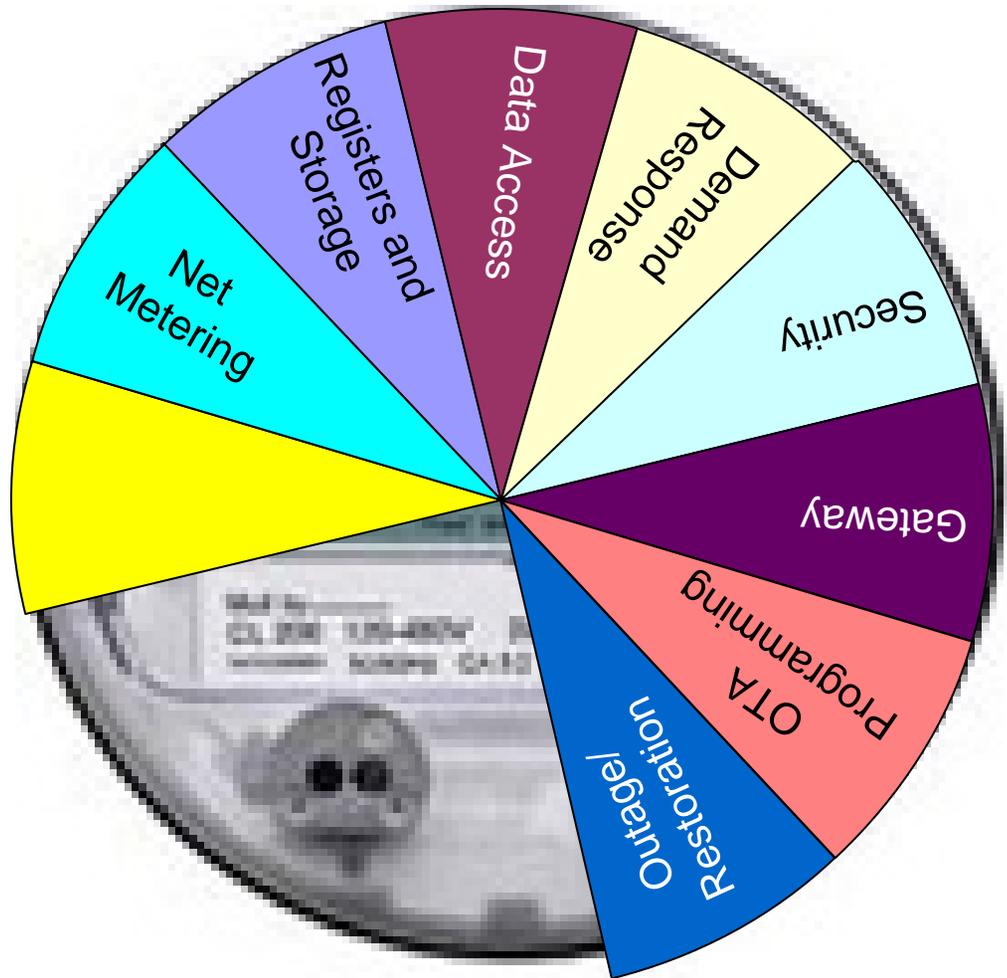
Prepared Question #3

Theft of Service

Is there a way to ensure a positive relationship between a given service point and a meter that would be able to detect a meter swap with a neighbor?



Prepared Question #4



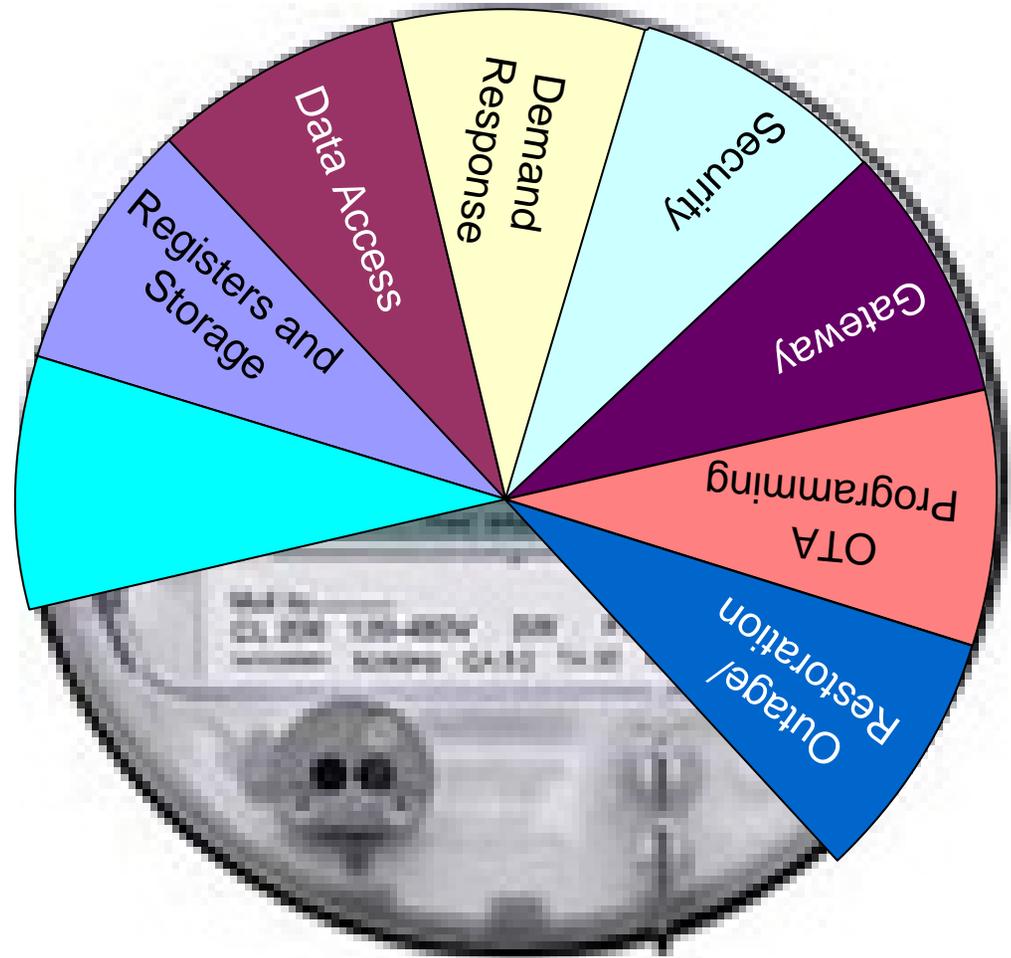
Standards & Interoperability

What is your view of meter interoperability and the adoption of standards across all meter types?

Prepared Question #5

Net Metering

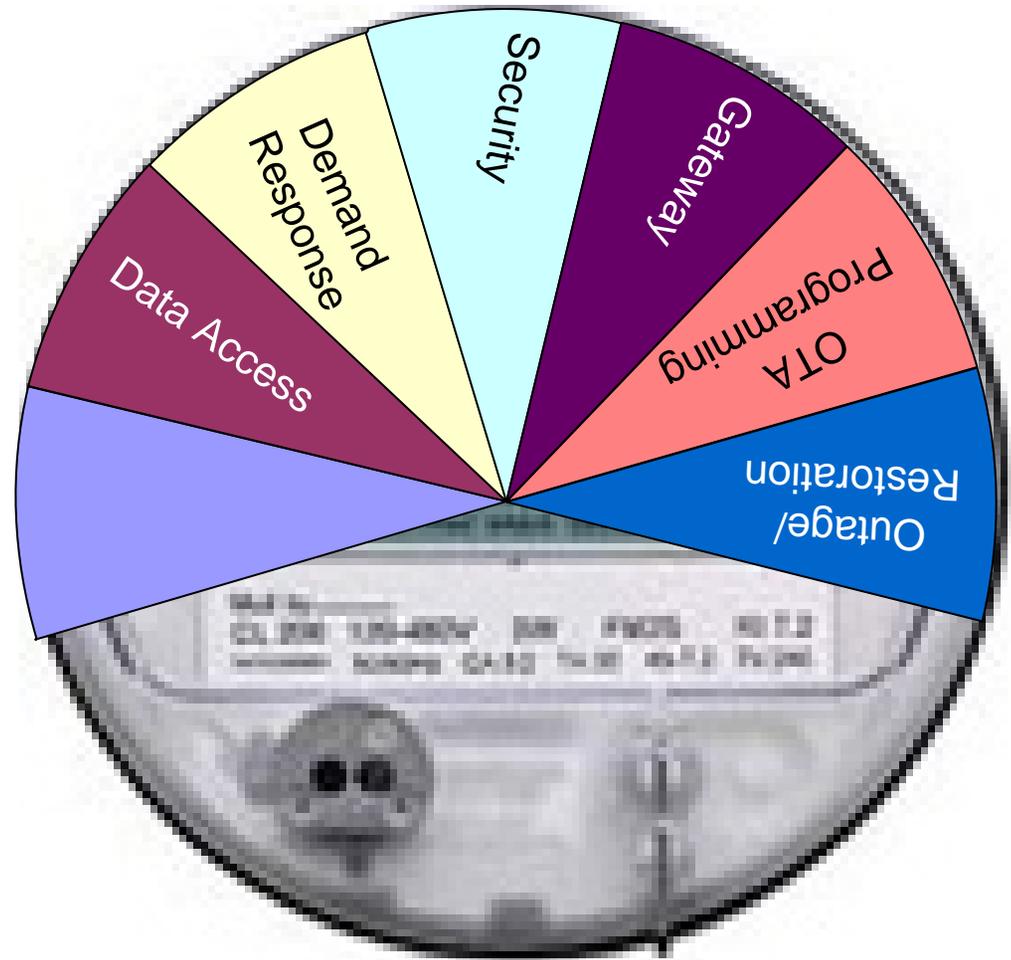
In anticipation of distributed or self generation should all classes of meters support net metering?



Prepared Question #6

Registers & Storage

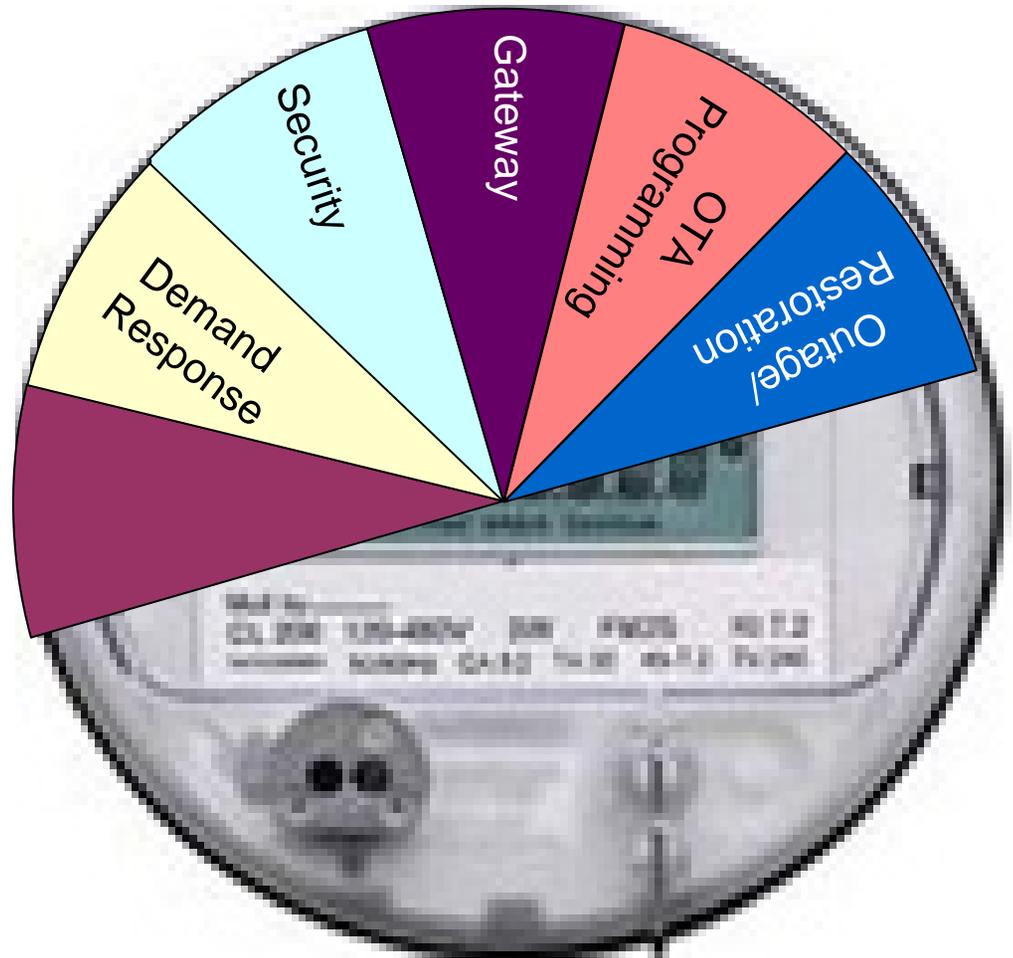
To support time of use and other time-sensitive consumption reporting what is the minimum amount of memory that should be specified in a basic meter?



Prepared Question #7

Data Access

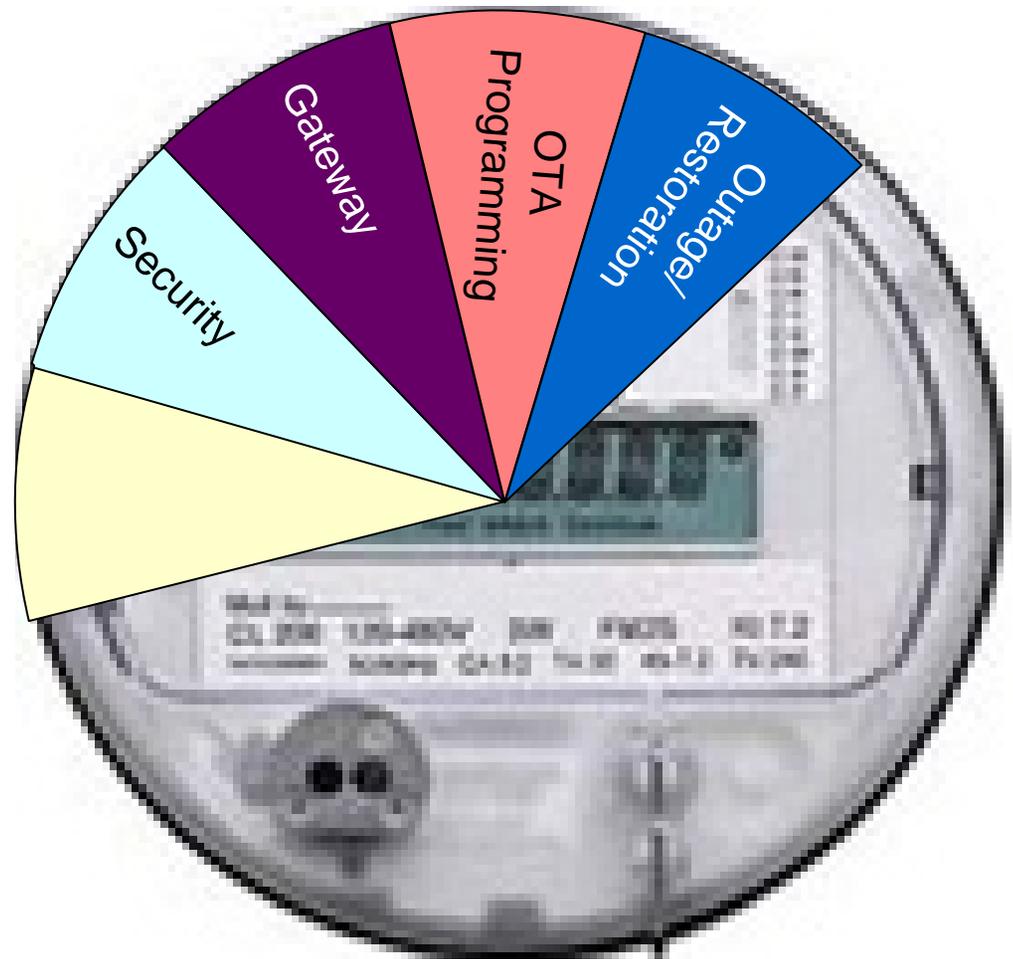
How can customers be provided real-time access to their meter data?



Prepared Question #8

Demand Response

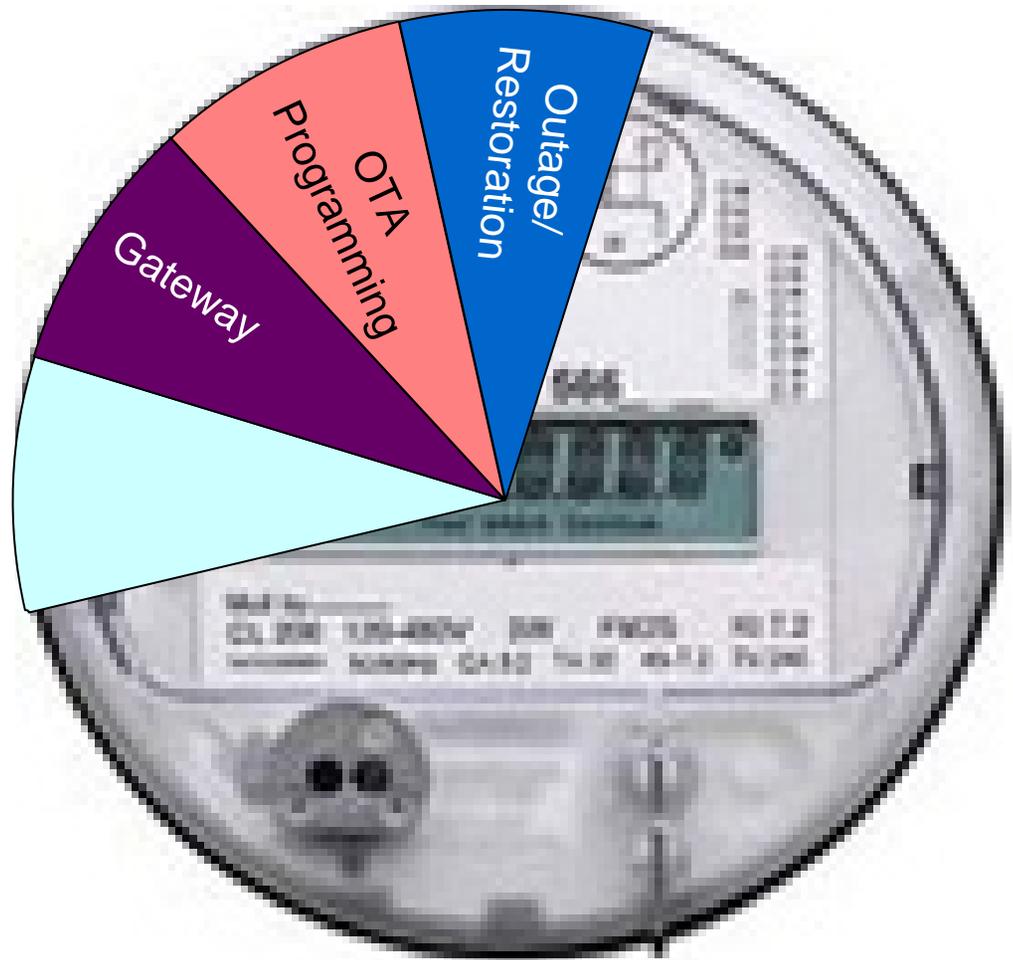
What role should a meter have in any Demand Response/Direct Load Control Program?



Prepared Question #9

Security

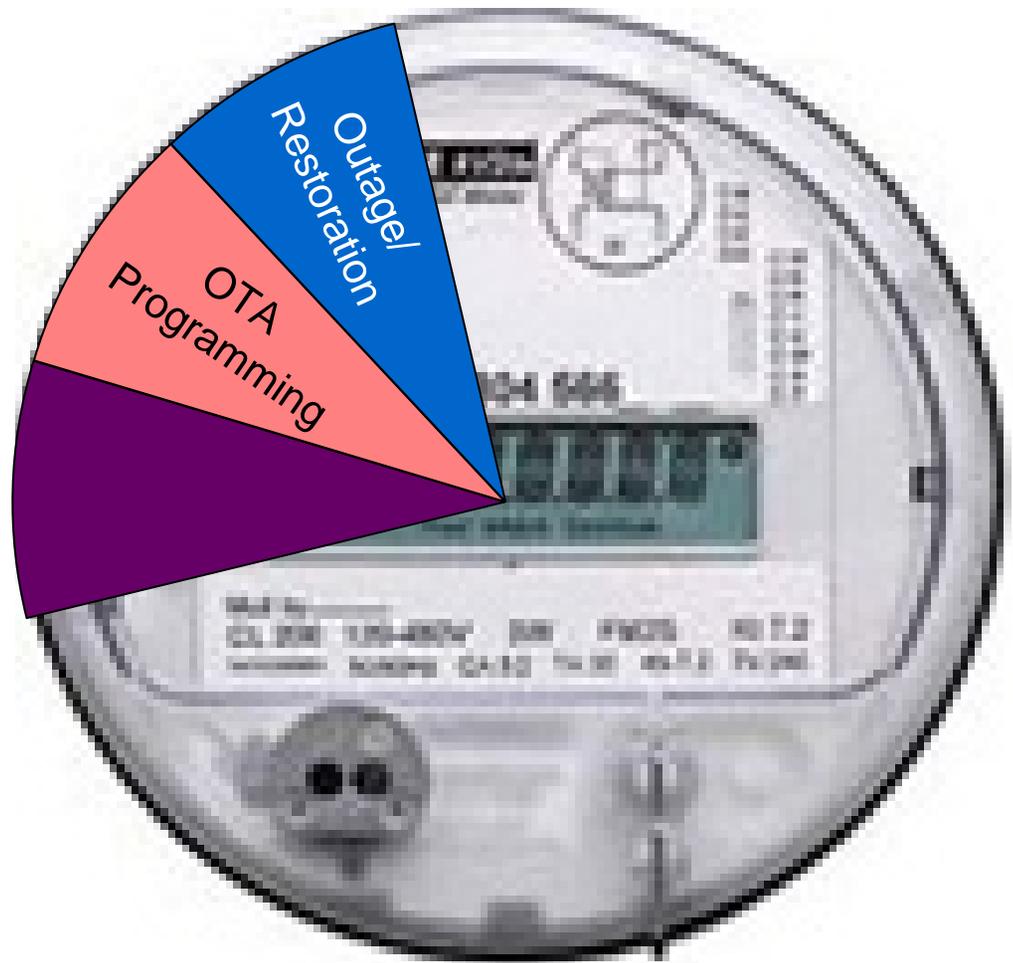
How is information stored within the meter? What are the security measures to ensure meter data integrity?



Prepared Question #10

Gateway

What are the pros and cons of the meter being a node in the network versus a gateway to other devices?



Prepared Question #12

Outage Restoration

How does the meter report positive outage reporting conditions how long will it be able to provide this information (last gasp)? Does it provide automatic and positive restoration? How is this balanced with network reporting capability?

