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# AMI TECHNOLOGY OVERVIEW



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*for Pennsylvania Rural Electric Association  
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# TOPICS WE WILL COVER

- Benefits of AMI and where we are starting from
- Overview of technologies
- How AMI is changing Meter Service Departments and metering jobs
- Metering and the Future of AMI





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# AMI BENEFITS

- Two-way communication to the meter
  - Why is this important or desirable?
- Usage
- Voltage
- Current
- Power Quality
- Disconnect/Reconnect
- Outages
- The Future
  - Location
  - Displays





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# PRE-AMI METER OPERATIONS

## Common Features and Common Sources of Concern



Old Electromechanical Meter

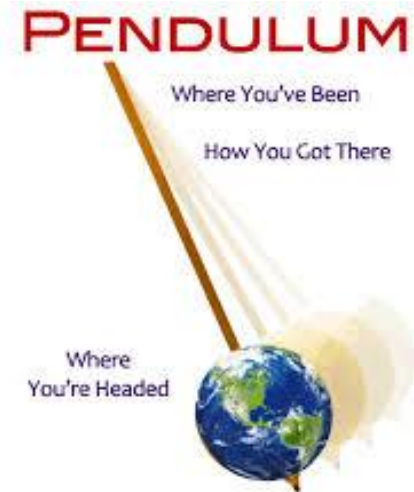


New Automated Meter

- Fewer meter techs in the field and in the shop than there were 25 years ago
- Fewer Field checks and site verifications due to lack of personnel, lack of experience and lack of expertise
- More features under glass in the meters even before AMI deployed
- Significantly more features under glass in every AMR and AMI system being considered or being deployed
- Metering losses starting to be identified “by accident” as opposed to being “by design”.

# THE PENDULUM STARTS TO MOVE

- Meter Operations. Prior to deployment many larger utilities take an attitude of “this is only metering – how hard can that be?”. Over the course of deployment Meter Operations gains a stature and a respect from the rest of the organization that was not previously accorded them – even if this is only begrudging respect.
- New tests for AMI meters (e.g. communication, disconnect) are identified
- The complexity and issues around high revenue metering are at least acknowledged by the rest of the organization
- Tests which have not been performed in years are suddenly back in vogue





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# THE NEW REALITIES

- Electro-Mechanical Meters typically lasted 30 years and more. Electronic AMI meters are typically envisioned to have a life span of fifteen years and given the pace of technology advances in metering are not expected to last much longer than this.
- This means entire systems are envisioned to be exchanged every fifteen years or so. In the interim the meter population and communication network inherent in the infrastructure for each utility must be maintained.
- Meter communication and meter data management are becoming as important to metering operations as meter accuracy.
- Firmware upgrades, firmware stability and cyber security are becoming increasingly important to metering departments





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# WHAT TECHNOLOGIES ARE WE USING?

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- RF Mesh
- Power Line Carrier (PLC)
- LTL Back Haul

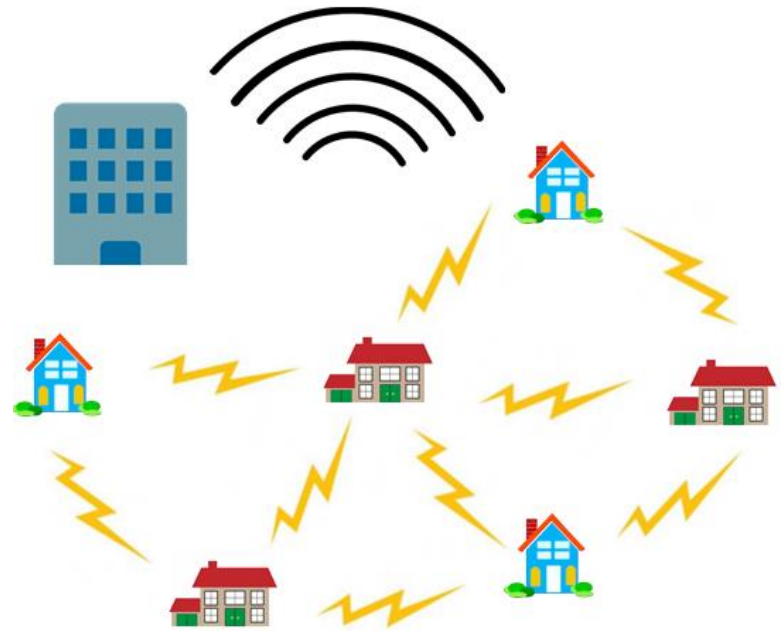




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# RF MESH

- True RF Mesh
- Meters and collectors
- Software and firmware
- Head End Systems
- The difference between frequencies
  - Proprietary and non-proprietary frequencies
  - Penetration vs. distance trade-off







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# POWER LINE CARRIER

- Pros and Cons
  - Copper Wires
  - Amount of data – now and in the future



- Infrastructure will win
  - IoT vs. number of meters
    - New IoT devices are being installed at a rate of 127 per second or 11 million per day
  - 165 million connected electric meter customers in the U.S. and Canada
    - After 12 years we are 60% complete or roughly 100 million done
- But never discount the fact that Electric Utilities will always own the Copper Wires. LTL and PLC will displace RF in the mid term and eliminate RF in the long term – strictly because of infrastructure and not on the merits of technology.



# QUESTIONS AND DISCUSSION

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