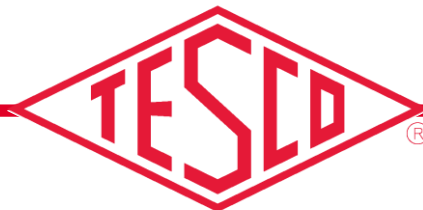


METERING LEADER SINCE 1904



THE EASTERN SPECIALTY COMPANY

# ZERO-INFRASTRUCTURE AMI SELECTION AND DEPLOYMENT



A TESCO COMPANY



*Presented by Jon Scott*

North Carolina Meter School  
Management Track  
Tuesday, June 13, 2023  
8:00 AM

## Agenda

- Introduction to TESCO Nighthawk
- Defining Zero-Infrastructure AMI
- Case Studies
  - Full AMI
  - Tactical/Targeted Deployment
  - Program-Specific Application





# ZERO-INFRASTRUCTURE AMI

- About Nighthawk
  - Over 25 years of utility experience
  - 100+ utilities served
  - AMI Solutions
    - Full-Deployment
    - Tactical

## Now a TESCO Company!



A TESCO COMPANY





## AMI Status?

slido



**When you think “Traditional AMI,” what word or phrase comes to mind?**

slido



**When you think “Zero-Infrastructure AMI,”  
what word or phrase comes to mind?**

# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Majority of AMI Solutions Require Costly Infrastructure:
  - Towers, Repeaters, Collectors, Access Points, etc.
- Many Require Additional Resources:
  - Network Administrators, DBA's, RF-Techs, etc.
- **Many AMI Technology Flavors**







# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Defining Zero-Infrastructure AMI
  - No Costly Infrastructure to Install/Maintain
  - Communications Under-Glass
  - IT Friendly / Cloud Hosted





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Zero-Infrastructure AMI
  - Cellular-Only
    - Full deployment or tactical
  - Cellular-RF Mesh Hybrid
    - Full deployment (great for small – medium size utilities)
  - Fiber
    - On the rise especially with the electric cooperatives
    - Fiber to pole or Fiber to home solutions



# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Zero-Infrastructure AMI cont.
  - Leveraging Private LTE
    - Mostly applicable to large utilities / IOU's
    - Protect lifespan of the data backhaul
    - Easy access to higher frequencies and amounts of interval data for AMI 2.0 applications



# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Studies
  - Full AMI (Co-op and Municipal)
  - Tactical/Targeted Deployment
  - Program Specific Application



# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI, Multi-Phase Deployment
  - **Hamilton County Electric Cooperative, TX**
    - 18,000 electric
    - Contacts
      - Lisa Lively, IT Specialist/ AMI Supervisor
    - Existing system: PLC







# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Hamilton County Electric Cooperative, TX**
    - Problem/Need:
      - Current system no longer supported by manufacturer
      - New meters for current system difficult to procure
      - Need for timely outage/ voltage reporting
      - Low to zero infrastructure to install/maintain
      - Easy to self deploy
      - Must allow for multi-year, multi-phase self deployment (flexible and scalable)
      - Low latency
      - Must integrate with NISC





# ZERO-INFRASTRUCTURE AMI

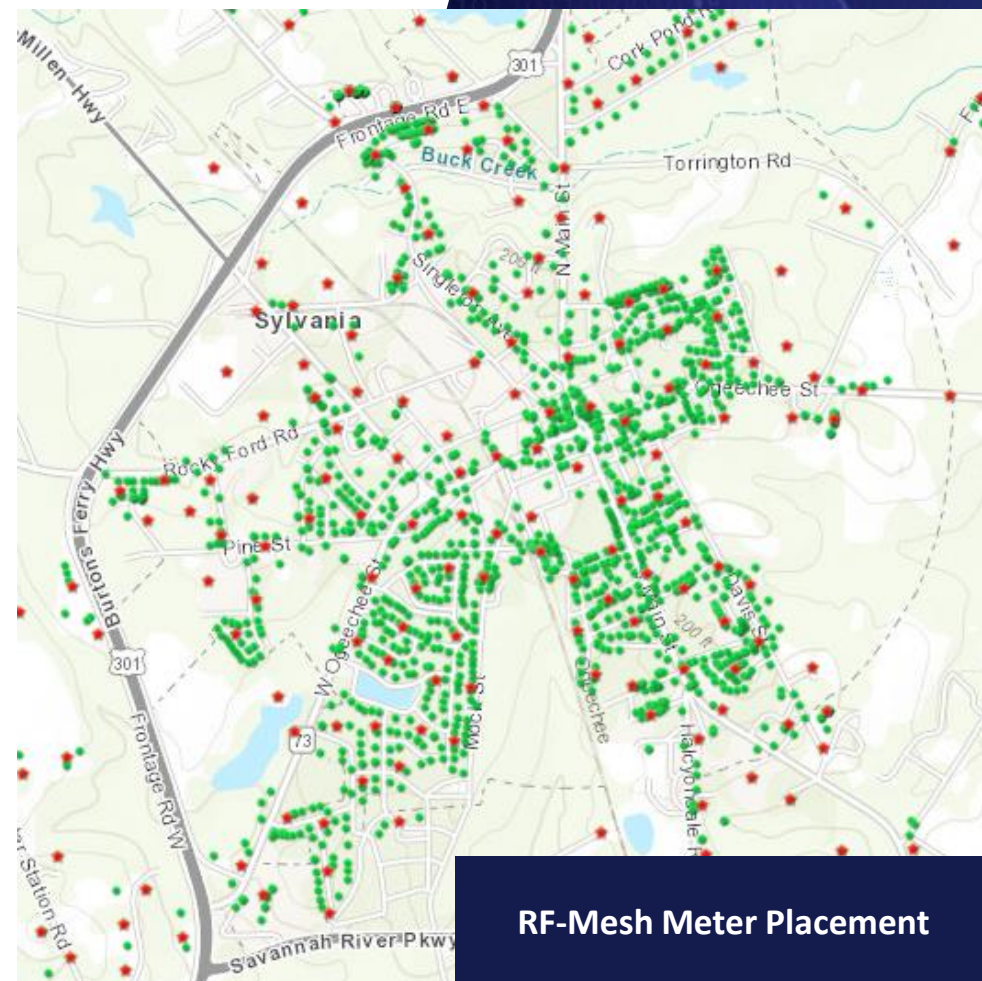
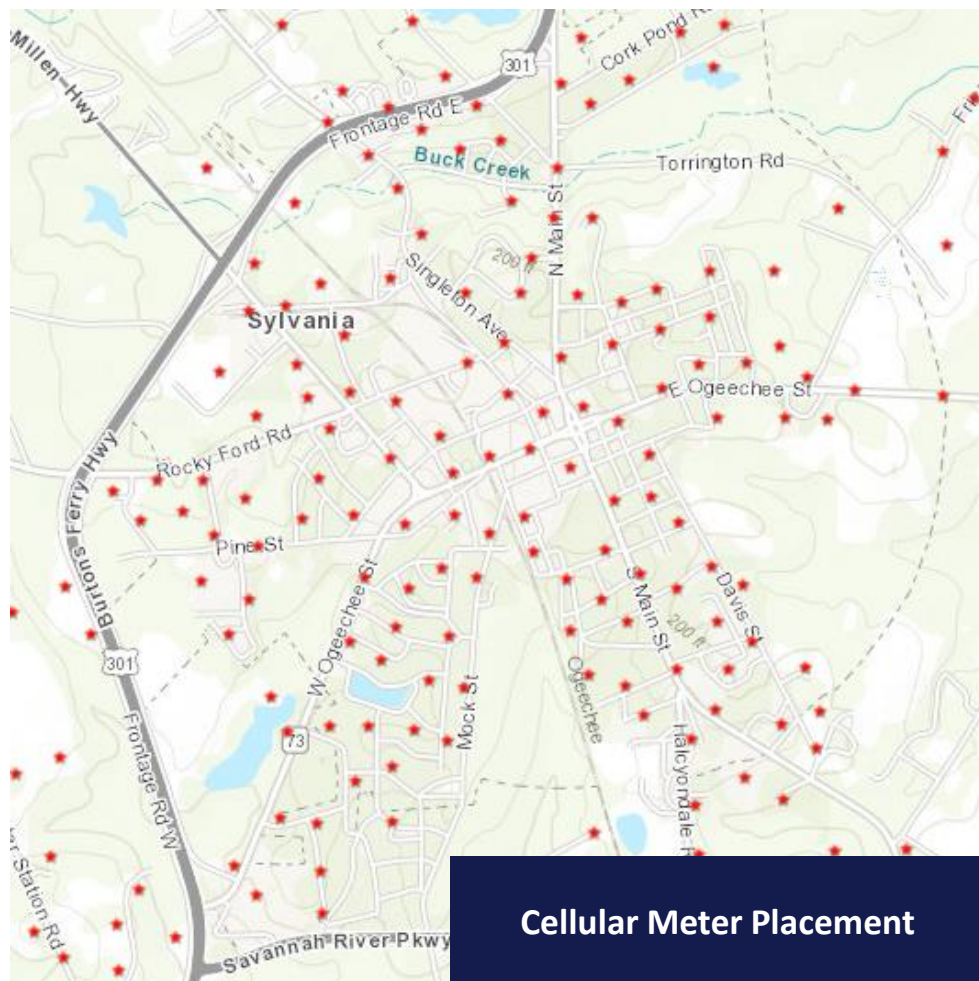
## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Hamilton County Electric Cooperative, TX**
    - Solution:
      - Started with evaluation of AMI technology options
      - Identified Cellular-Mesh topology to be potential solution
      - Conducted thorough communications testing and RF-study
      - Provided full-system deployment plan
      - Evaluated hardware and software functionality
      - Integrated with NISC CIS
      - Used Fulcrum software for self- deployment (meter change out)
      - Typically order a substation a quarter



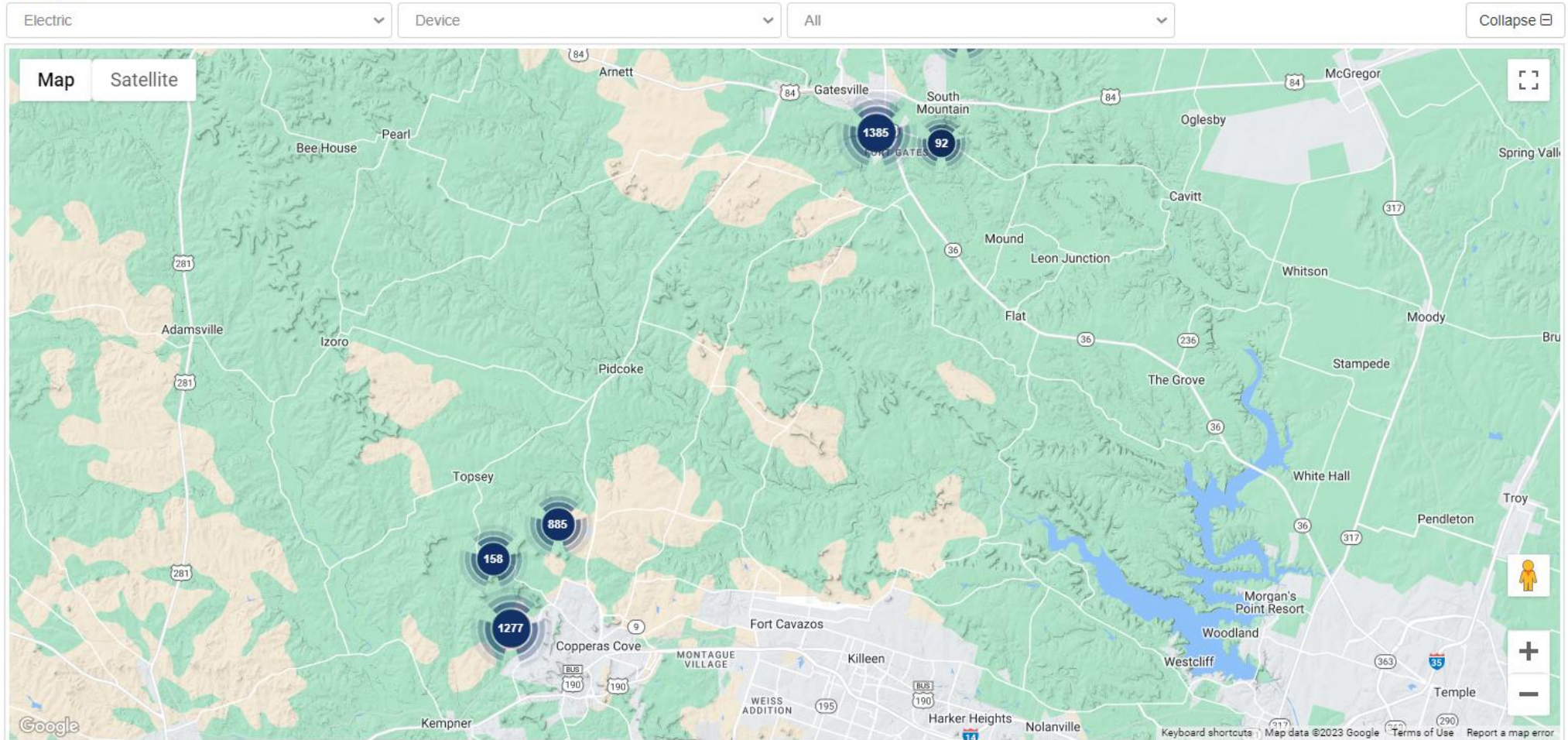
# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

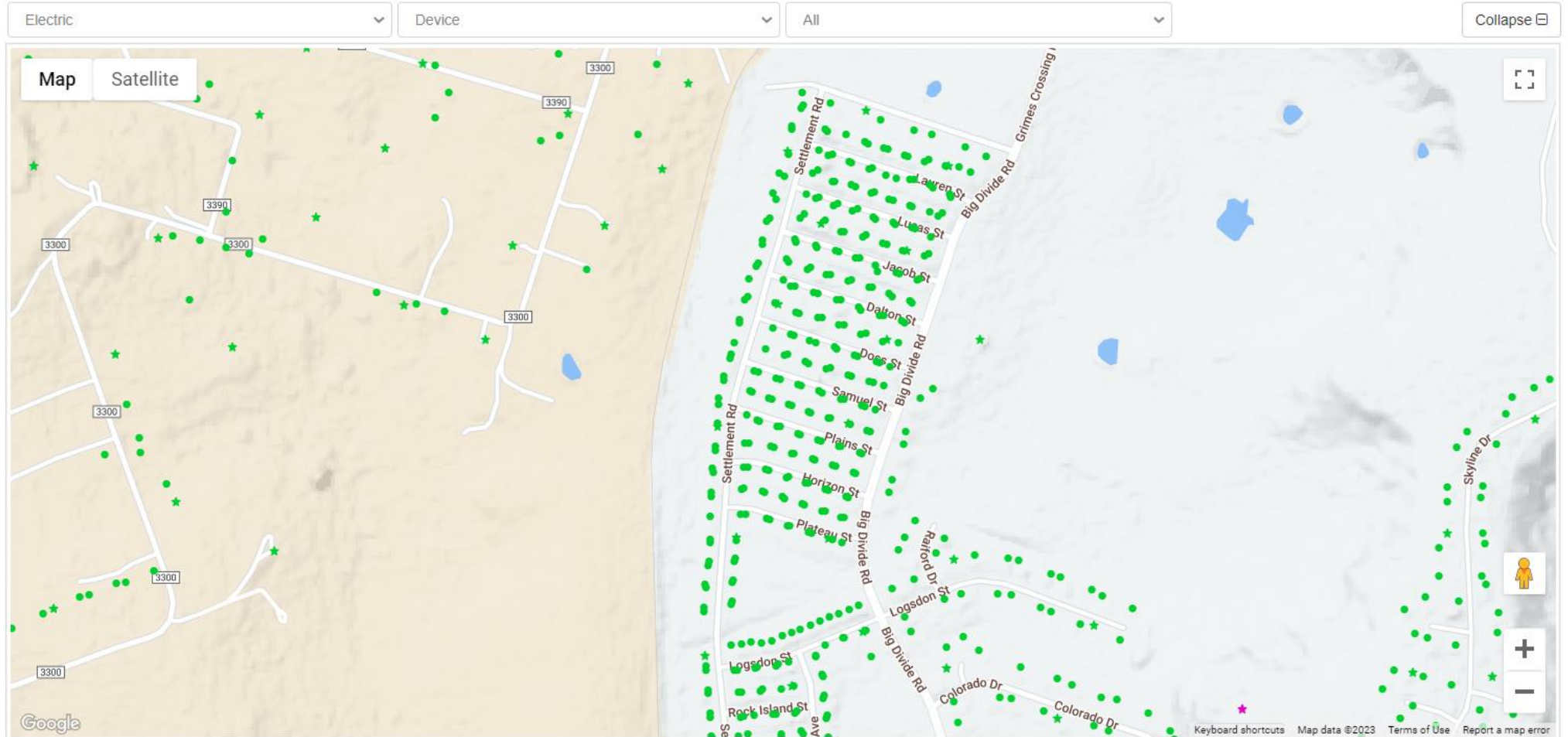




## Maps



## Maps





## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Hamilton County Electric Cooperative, TX**
    - Outcome:
      - 2 substations deployed with a third in the works
      - 10-30 seconds for on-demand reads, disconnects, demand resets, etc.
      - Nothing to maintain beyond the meters (zero-infrastructure)
      - Standard AMI benefits
        - Preventing truck rolls
        - Timely outage/voltage reporting
        - Remote reading/disconnect
        - Etc.





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Hamilton County Electric Cooperative, TX**
    - Challenges/Lessons Learned:
      - Working the wrinkles out of the billing integration
        - Maintaining consistency from previous system
      - Meter lead times jumping from 3-4 weeks to 6-8 weeks
      - Resource bandwidth (manpower to deploy)





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

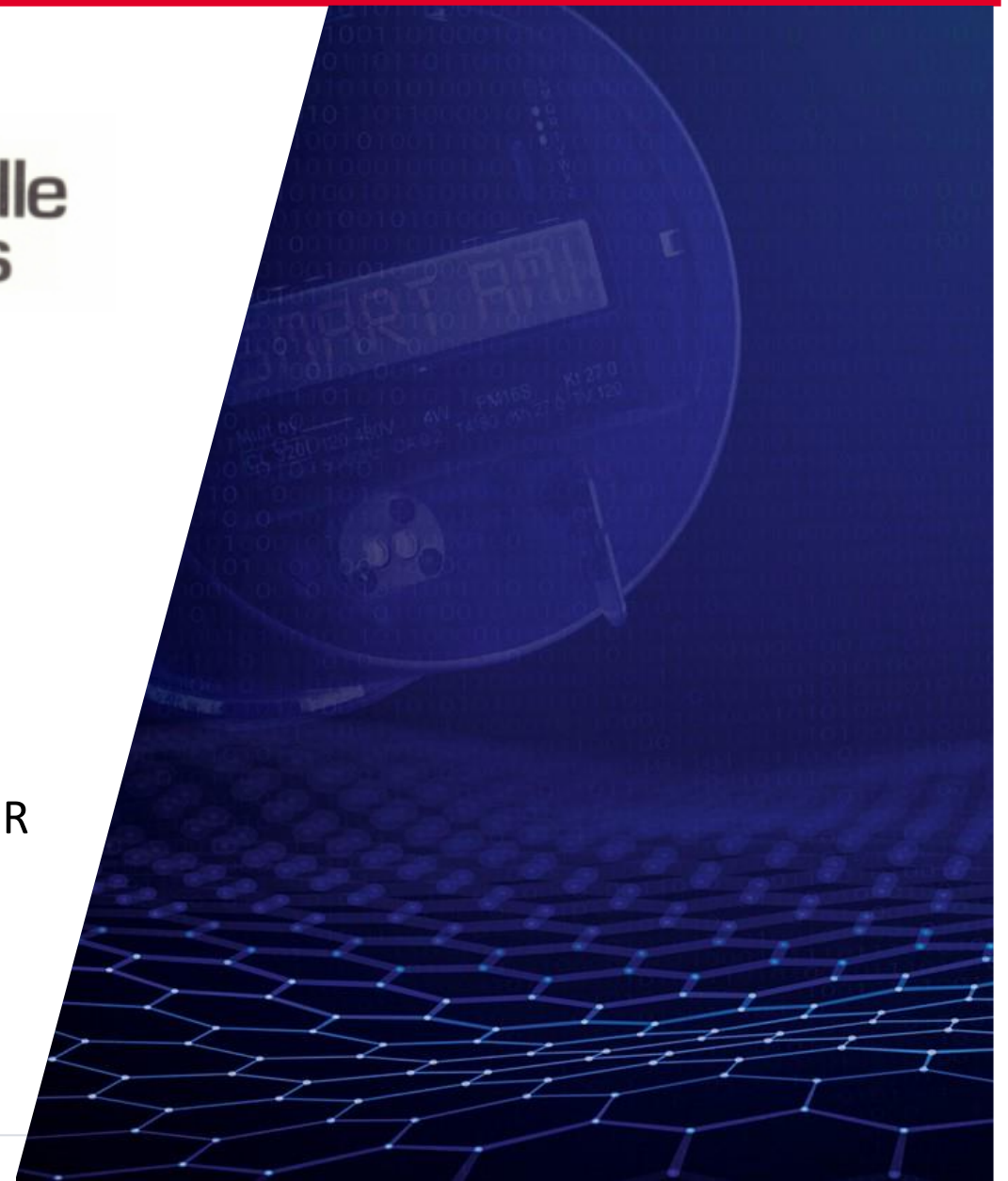
- Case Study – Full AMI
  - **Hamilton County Electric Cooperative, TX**
    - What's next:
      - Continue per-substation deployment



# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Louisville Utilities, MS**
    - 3,200 electric, 3,200 water
    - TVA member
    - Contacts
      - Wilson Webb, General Manager
      - Jay McLendon, Office Manager
    - Old system: 10+ year old Electric and Water AMR solution







# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Louisville Utilities, MS**
    - Problem/Need:
      - Remote Disconnect/Read, Outage/Voltage reporting
      - Limited resources
      - Low to zero infrastructure to install/maintain
      - Easy to self deploy
      - Not turning meter-techs into RF techs
      - Must allow for multi-year, multi-phase self deployment (flexible and scalable)
      - No onsite server requirement (hosted)
      - Easy to operate single-software solution (no DBA or network admin)
      - Low latency
      - Must integrate with CSA MDM/CIS
      - Multi-service







# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

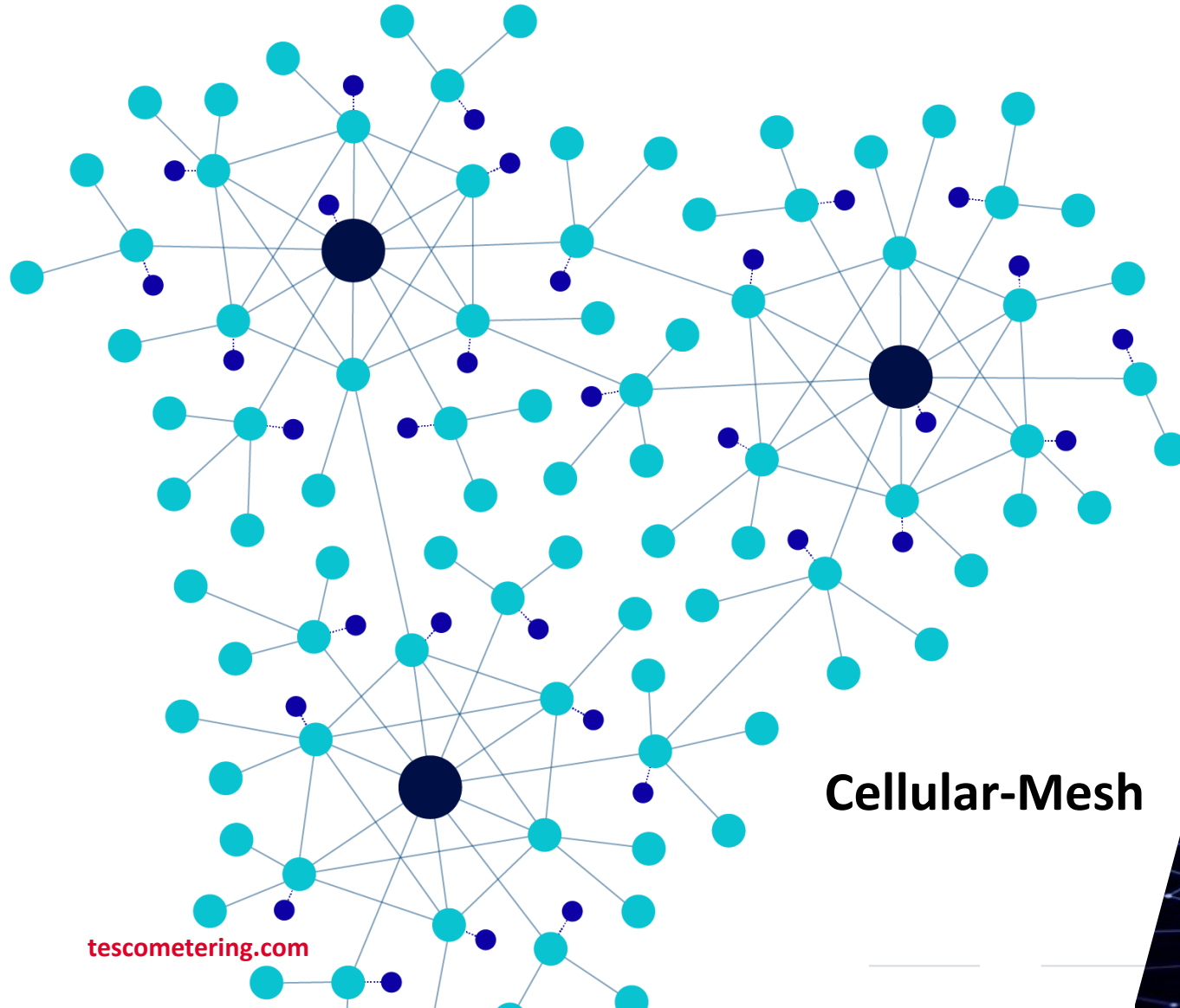
- Case Study – Full AMI
  - **Louisville Utilities, MS**
    - Solution:
      - Started with evaluation of AMI technology options
      - Explored remote ERT collection as a “bridge” to full AMI
      - Because of Water-ERT age-related limitations , decided to go straight to AMI
      - Identified Cellular-Mesh topology to be potential solution
      - Conducted thorough communications testing and RF-study
      - Provided full-system deployment plan
      - Deployed 3-month pilot in “worst case scenario” location
      - Integrated with CSA MDM
      - Evaluated hardware and software functionality
      - Used Fulcrum software for self- deployment (limit human error)
      - “Pallet a Month Club” to compensate for resource/budget realities





# ZERO-INFRASTRUCTURE AMI

AMI | ADVANCED METERING



Cellular-Mesh

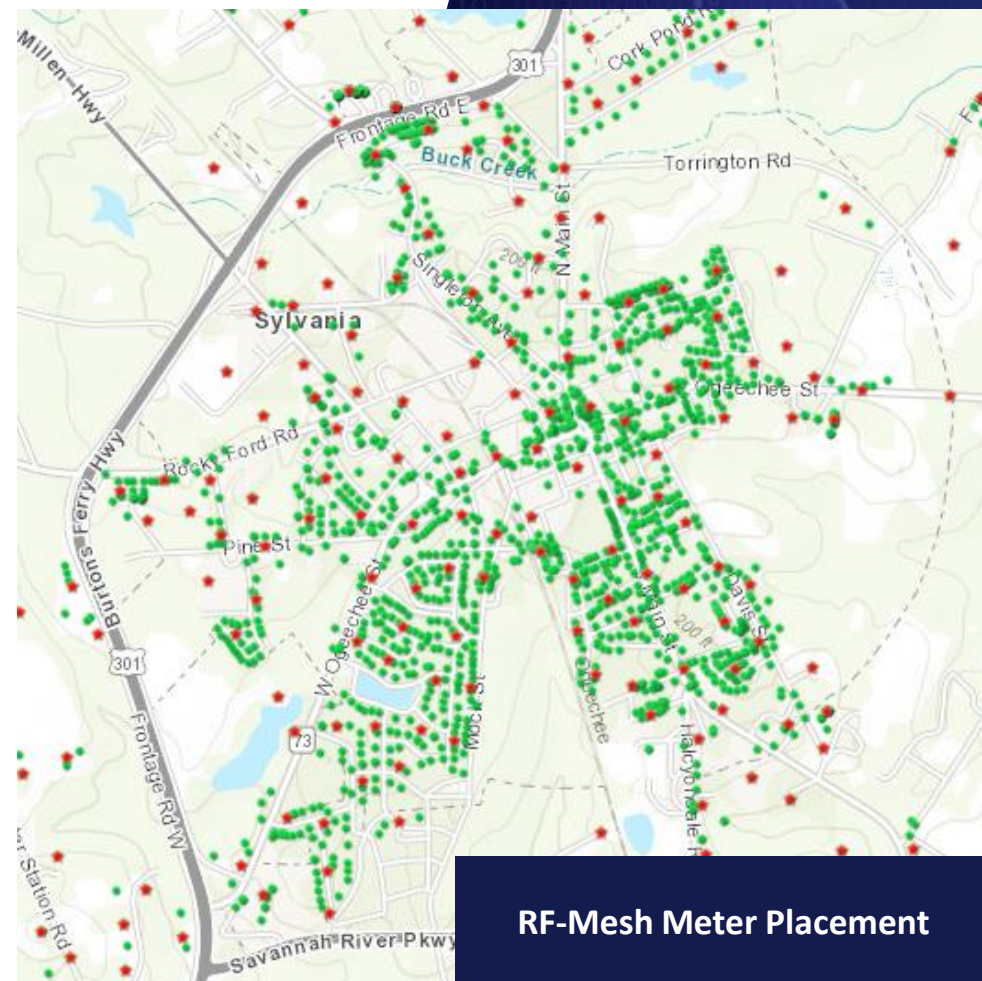
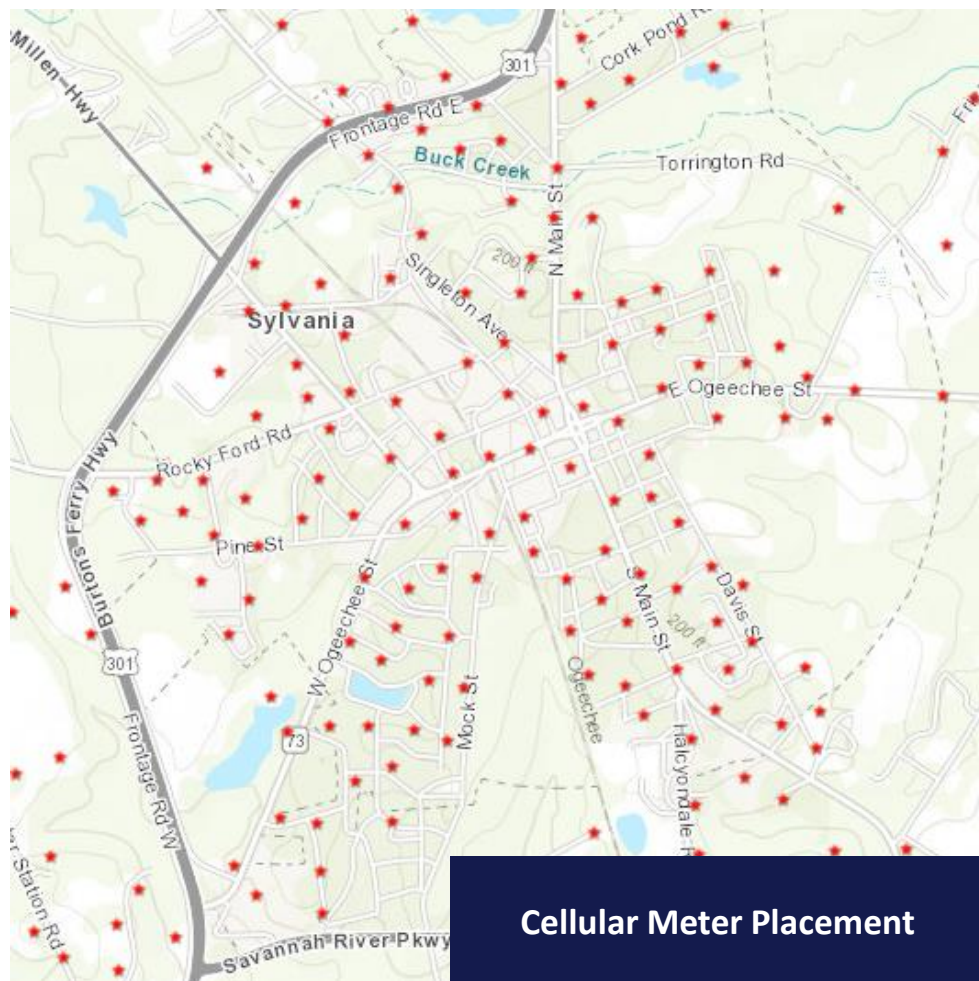
[tescometering.com](http://tescometering.com)





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

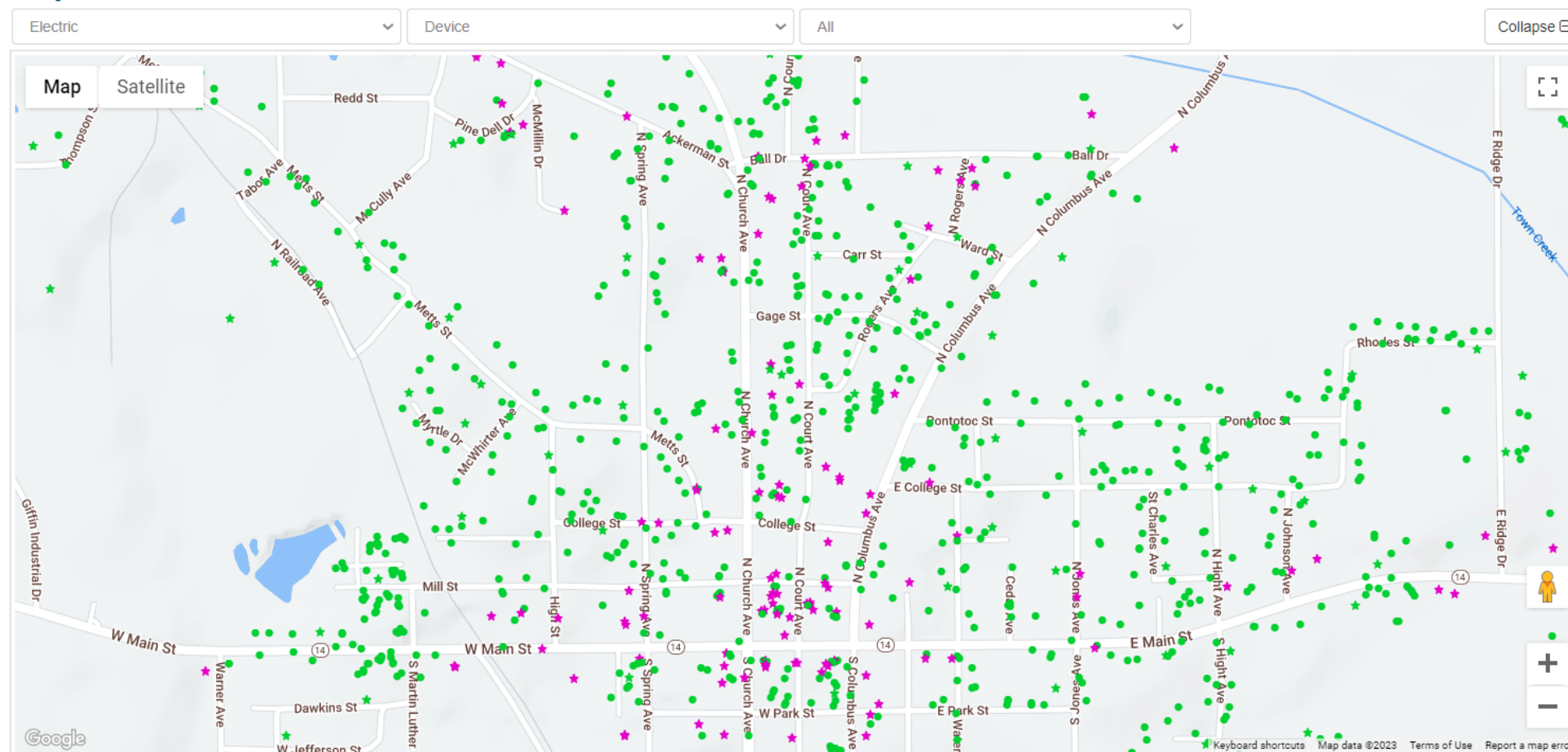





# ZERO-INFRASTRUCTURE AMI

Alerts: **238**[Home](#) | [Help](#) | [Contact Us](#) | [Logout](#)Search: 

## Maps




# ZERO-INFRASTRUCTURE AMI




Alerts: **238**

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Search:




BILLING




OPERATIONS




CUSTOMERS



REPORTS




SYSTEM SETUP




USERS

## Customer Detail

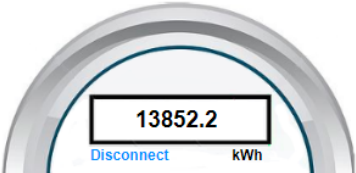
 **Connected**

Recent Activity: TI received at 01:40:44 AM on March 14, 2023

[Back](#) [Edit](#) [Delete](#)



### Last Read



13852.2  
Disconnect kWh

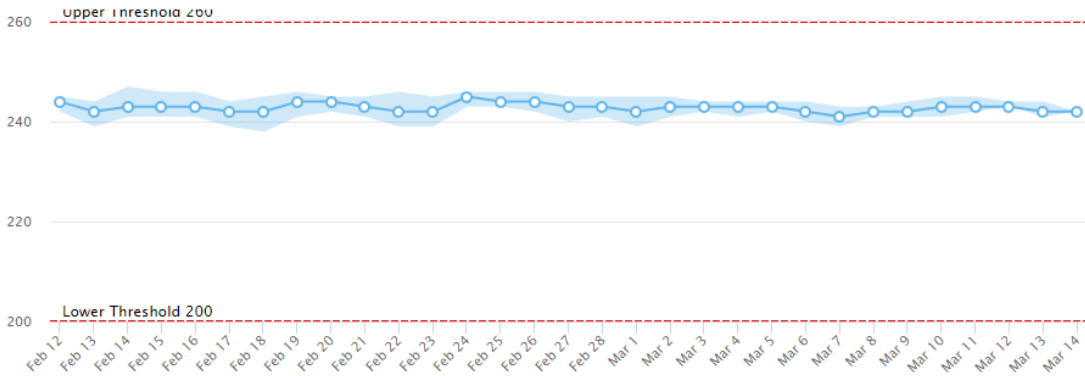
Utility:	Electric
Multiplier:	1
Radio Type:	Nighthawk
Serial Number:	
Meter Number:	
Meter Form Factor:	02
Firmware Version:	3.61
Meter Status:	Installed
Device Type:	Hub
Associated Leafs:	9

### Meter Activity

☐ Interval ☒ Daily ☐ Monthly ☐ Yearly

[Consumption](#) [Voltage](#) [Outage](#) [Device Map](#)

#### Daily Voltage Summary



[< Previous](#) [Next >](#)



BILLING



OPERATIONS



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REPORTS



SYSTEM SETUP



USERS

## Customer Detail

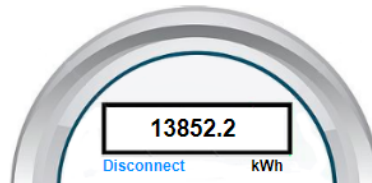
[Back](#)[Edit](#)[Delete](#)

Connected

Recent Activity: TI received at 01:40:44 AM on March 14, 2023



## Last Read



Utility:	Electric
Multiplier:	1
Radio Type:	Nighthawk
Serial Number:	
Meter Number:	
Meter Form Factor:	02
Firmware Version:	3.61
Meter Status:	Installed
Device Type:	Hub
Associated Leafs:	9

Communication Log

## Meter Activity

☐ Interval ☐ Daily ☒ Monthly ☐ Yearly

[Consumption](#)[Voltage](#)[Outage](#)[Device Map](#)

Show 10 entries

Search:

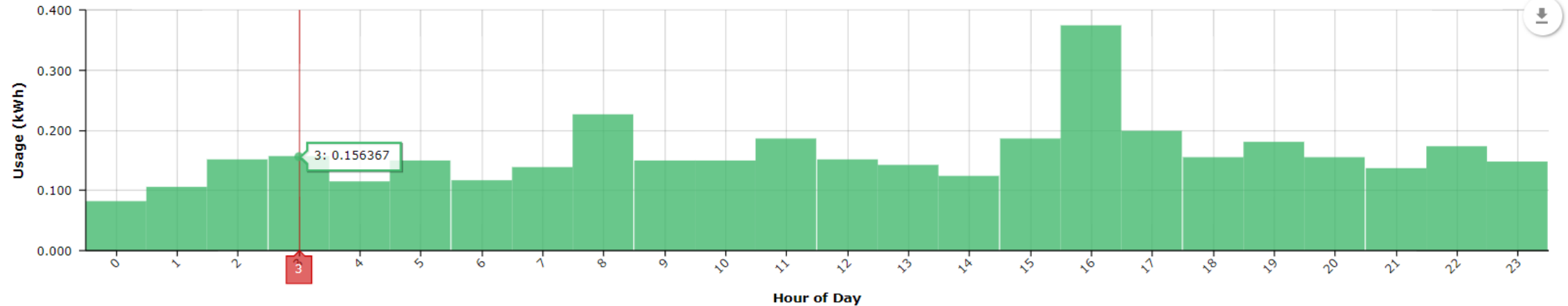
Outage StartTime	Outage EndTime	Event Type	Outage Time	Blink Count
01/08/2023 01:29:11 AM	01/08/2023 01:29:12 AM	Momentary	0:00:01	
02/22/2023 02:43:53 AM	02/22/2023 02:43:54 AM	Momentary	0:00:01	
03/03/2023 10:23:44 AM	03/03/2023 10:23:45 AM	Momentary	0:00:01	
03/05/2023 09:26:33 AM	03/05/2023 09:26:39 AM	Momentary	0:00:06	
03/11/2022 10:45:30 PM	03/11/2022 11:50:18 PM	Sustained	1:04:48	
03/30/2022 06:30:01 PM	03/30/2022 06:30:02 PM	Momentary	0:00:01	
03/30/2022 06:38:29 PM	03/30/2022 06:38:31 PM	Momentary	0:00:02	
05/07/2022 09:31:46 AM	05/07/2022 09:31:48 AM	Momentary	0:00:02	
05/07/2022 09:32:10 AM	05/07/2022 09:32:12 AM	Momentary	0:00:02	
05/24/2022 04:42:07 PM	05/24/2022 04:42:08 PM	Momentary	0:00:01	

Previous 1 2 Next



# ZERO-INFRASTRUCTURE AMI

## Average Hourly Use



## Consumption Intervals

Bad Read (QC)
Zero Usage
Low for Day
Critical Peak
High for Day
Estimated Read
Missing Read

Date	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
03/13/2023	0.046000	0.087000	0.046000	0.046000	0.381000	0.086000	0.045000	0.045000	0.093000	0.368000	0.045000	0.050000	0.080000	0.046000	0.373000	0.372000	0.173000	0.046000	0.046000	0.418000	0.04
03/12/2023	0.085000	0.049000	0.047000	0.047000	0.047000	0.346000	0.106000	0.046000	0.078000	0.062000	0.046000	0.415000	0.046000	0.046000	0.087000	0.046000	0.079000	0.369000	0.046000	0.086000	0.04
03/11/2023	0.075000	0.046000	0.406000	0.046000	0.059000	0.075000	0.046000	0.413000	0.046000	0.046000	0.072000	0.063000	0.362000	0.086000	0.047000	0.047000	0.089000	0.046000	0.420000	0.059000	0.04
03/10/2023	0.046000	0.142000	0.450000	0.046000	0.046000	0.084000	0.063000	0.045000	0.395000	0.059000	0.046000	0.095000	0.046000	0.051000	0.426000	0.046000	0.097000	0.046000	0.064000	0.075000	0.37
03/09/2023	0.047000	0.047000	0.093000	0.380000	0.073000	0.067000	0.045000	0.088000	0.057000	0.369000	0.081000	0.061000	0.045000	0.094000	0.076000	0.477000	0.087000	0.046000	0.094000	0.046000	0.10
03/08/2023	0.071000	0.069000	0.046000	0.094000	0.381000	0.093000	0.045000	0.069000	0.079000	0.046000	0.419000	0.058000	0.046000	0.095000	0.046000	0.054000	0.403000	0.046000	0.091000	0.046000	0.05
03/07/2023	0.060000	0.053000	0.087000	0.046000	0.140000	0.429000	0.046000	0.072000	0.068000	0.045000	0.101000	0.364000	0.072000	0.071000	0.083000	0.152000	1.393000	0.049000	0.092000	0.045000	0.09
03/06/2023	0.092000	0.046000	0.089000	0.379000	0.046000	0.097000	0.046000	0.046000	0.087000	0.446000	0.061000	0.088000	0.046000	0.062000	0.083000	0.045000	0.095000	0.379000	0.049000	0.091000	0.04
03/05/2023	0.046000	0.095000	0.046000	0.066000	0.399000	0.046000	0.088000	0.046000	0.046000	0.085000	0.367000	0.090000	0.057000	0.046000	0.091000	0.046000	0.382000	0.077000	0.046000	0.094000	0.04



# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Louisville Utilities, MS**
    - Outcome:
      - Electric 80% deployed
      - Water 10% deployed
      - 10-30 seconds for on-demand reads, disconnects, demand resets, etc.
      - Nothing to maintain beyond the meters (zero-infrastructure)
      - Standard AMI benefits
        - Preventing truck rolls
        - Outage/voltage reporting
        - Remote reading/disconnect
        - Etc.



# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Louisville Utilities, MS**
    - Challenges/Lessons Learned:
      - Older water meter registers hindering retrofit
      - Meter lead times jumping from 3-4 weeks to 6-8 weeks





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Full AMI
  - **Louisville Utilities, MS**
    - What's next:
      - Leveraging MDM for AMI commands (deeper integration)
      - Using AMI data and CSA MDM for transformer loading, line/water loss recovery and other advanced analytical applications









# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Tactical/Targeted Deployment
  - **Lexington, NC**
    - Solution:
      - 100% LTE cellular under-glass solution w/ ERT transmit
      - AMI headend for remote disconnect (single and batch), outage, voltage and additional command/visualization options



# ZERO-INFRASTRUCTURE AMI



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## Maps



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OPERATIONS



CUSTOMERS



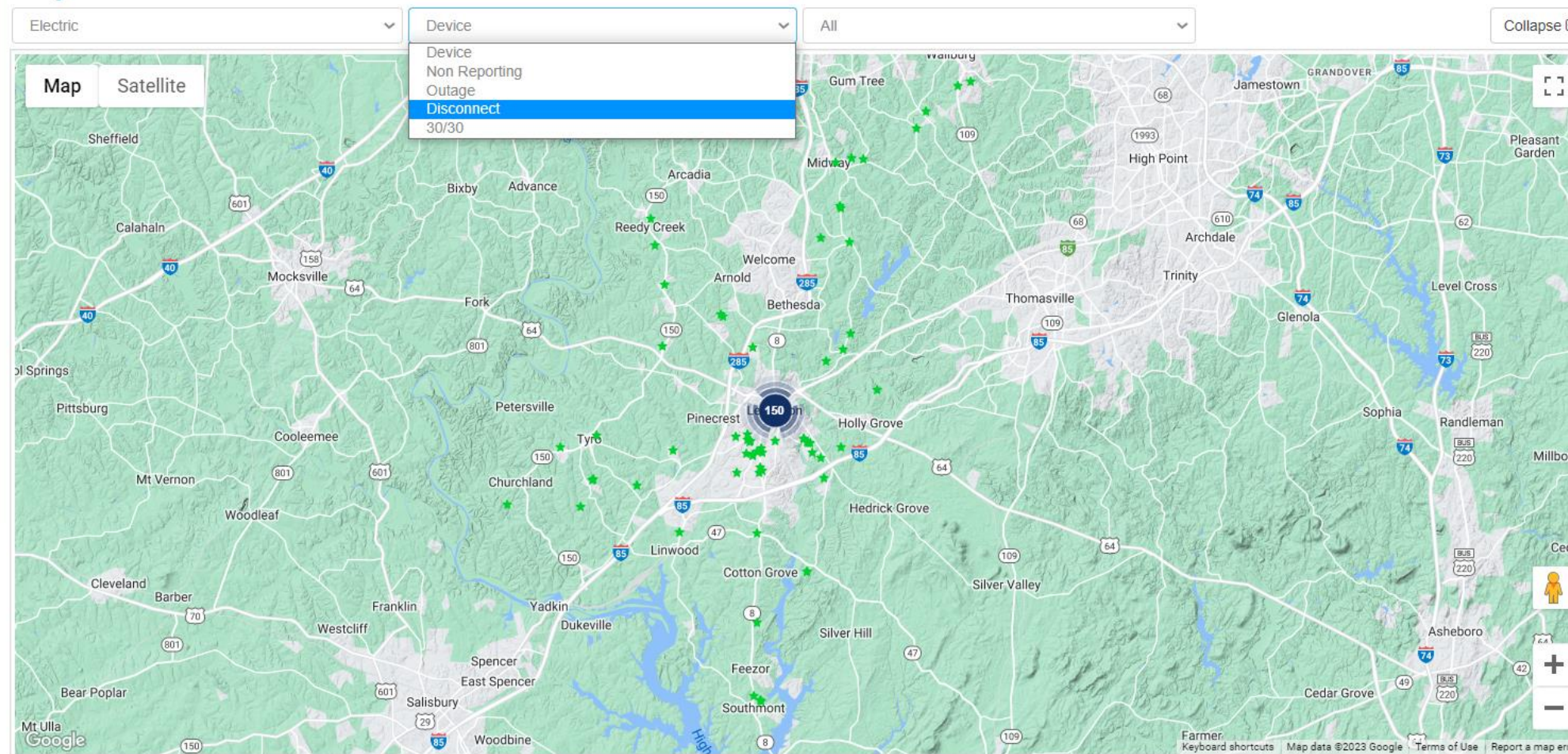
REPORTS



SYSTEM SETUP



USERS







# ZERO-INFRASTRUCTURE AMI



SYSTEM SETUP



USERS



Utility:	Electric
Multiplier:	1
Radio Type:	Nighthawk
Serial Number:	
Meter Number:	
Meter Form Factor:	02
Firmware Version:	3.61
Meter Status:	
Device Type:	Hub
Associated Leafs:	None

[Communication Log](#)

## Customer Information

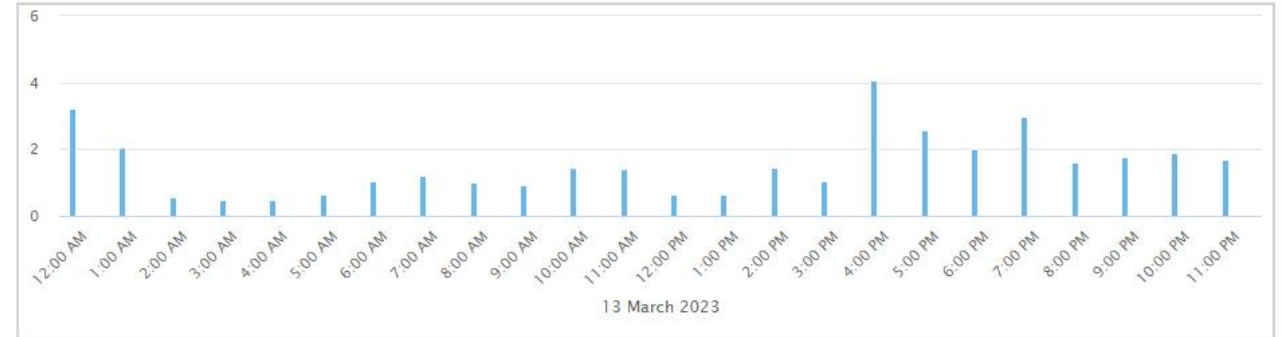
Customer Number:	
Customer Name:	
Address	
City	Lexington
State	North Carolina
Zip	27292
Bill Cycle	
Route	

## Read Details

Midnight Read on March 14, 2023	5398.22
Last Meter Read at 09:00:00 AM on March 14, 2023	
Meter Reading	5407.72
kWh Received	0
Voltage	244.6 V
Current	1.4 A
Instantaneous Demand (KW)	0.34
<a href="#">History</a>	

[Consumption](#)[Voltage](#)[Outage](#)[Device Map](#)

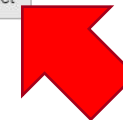
## Daily Consumption (kWh)

[< Previous](#)[Next >](#)

## Meter Control Options

[Disconnect](#) [Show Status](#)

This device is currently Connected!

[Disconnect](#)



## AMI | ADVANCED METERING

- Case Study – Tactical/Targeted Deployment
  - **Lexington, NC**
    - Outcome:
      - Reliable, scalable and flexible disconnect solution for electric system
      - Integrates with existing drive-by AMR setup
      - Maximized AMR investment





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Tactical/Targeted Deployment
  - **Lexington, NC**
    - Challenges/Lessons Learned:
      - Transition from CDMA to LTE





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Tactical/Targeted Deployment
  - **Lexington, NC**
    - What's next?:
      - Existing system can transition to Cellular-Mesh hybrid system if desired
      - Electric system can act as the communication scaffolding for water and/or gas





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Program Specific Application
  - **Electric Cities of Georgia, GA**
    - Contact:
      - Brian Jaynes, Vice President, Engineering
    - Electric Cities of Georgia (ECG) is a non-profit organization providing strategic and technical services to 52 public power communities with utility operations.
    - Program: Customer Choice





## AMI | ADVANCED METERING

- Case Study – Program Specific Application
  - **Electric Cities of Georgia (ECG), GA**
    - Program: Customer Choice – Georgia PSC
      - Any provider (IOU, Co-op, Municipal) can bid on customer projects typically 900kW and greater
        - Crypto-mining facilities ~50% - hourly market rates
        - Warehouses, Movie Studios, etc.
      - ECG will work with providers on project bids, rate design, and metering, reading, and billing if needed
        - Typically medium to small utilities
        - ECG is able to handle the complicated rates/ interval data needed for incentive rates.



## AMI | ADVANCED METERING

- Case Study – Program Specific Application
  - **Electric Cities of Georgia (ECG), GA**
    - Problem/Need:
      - Resource constraints
      - Needed an easily maintainable, under-glass solution
        - Wanted all infrastructure in meter to simplify deployment
        - No need for a cabinet or power source for external modem/ components
      - Cost effectiveness upfront and ongoing a factor
      - Software/Hardware needed to provide interval data (hourly and sub hourly)



## AMI | ADVANCED METERING

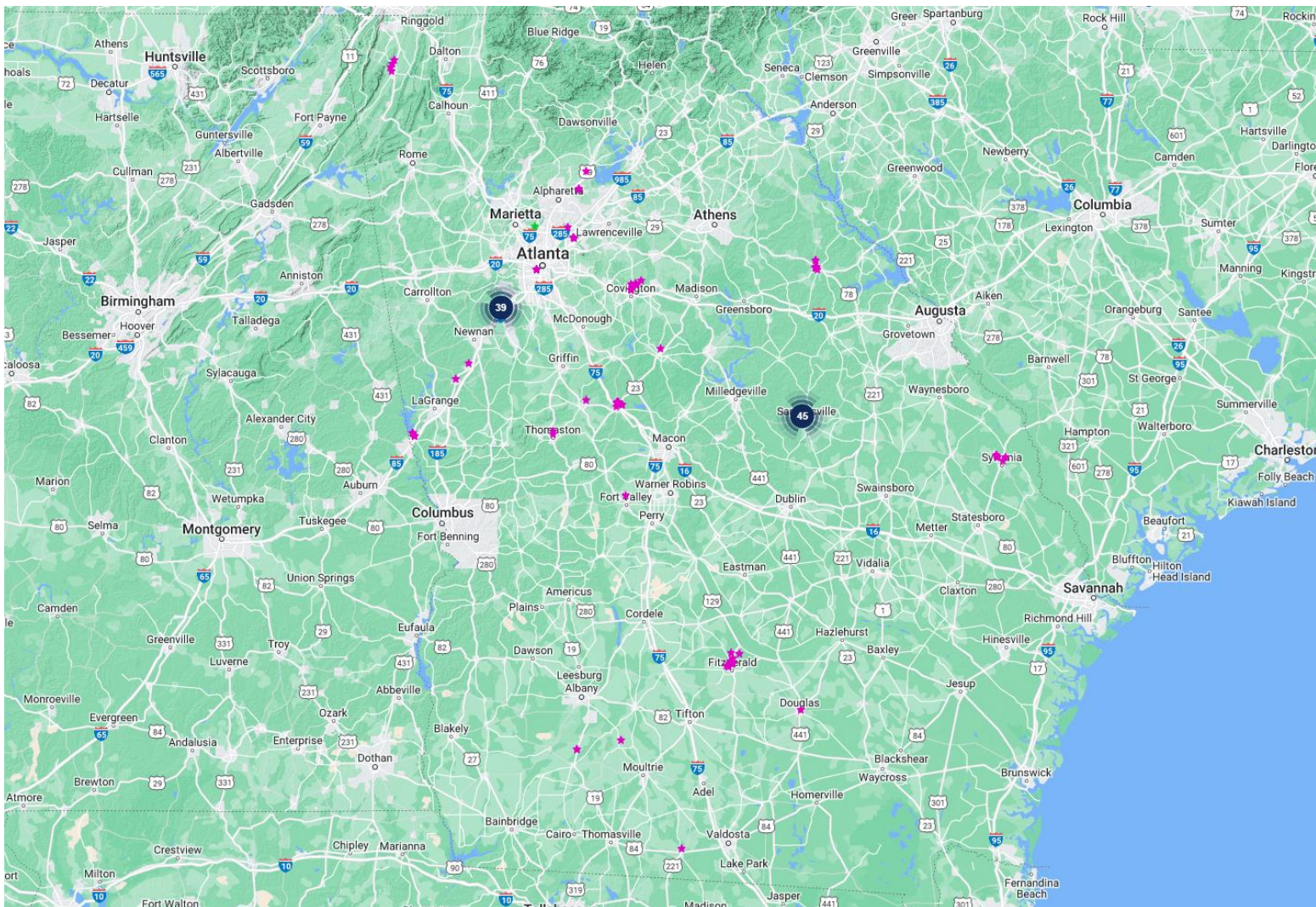
- Case Study – Program Specific Application
  - **Electric Cities of Georgia (ECG), GA**
    - Solution:
      - Evaluated several solutions
        - Laden with cumbersome communications (dial-up)
        - Not cost effectively scalable
        - Lacked the configuration flexibility to meet the ECG's specific needs
      - Chose a solution that offers a 100% LTE under-glass option
      - Vendor handles all communication contracts
      - Majority of locations use a 9S/20 kV2c.
      - Headend Software is a scalable AMI dashboard that allows ECG to remotely read and monitor meters across the state of Georgia
      - Software exports a file that is used by ECG for customer billing





# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING





# ZERO-INFRASTRUCTURE AMI



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BILLING



OPERATIONS



CUSTOMERS



REPORTS



SYSTEM SETUP



USERS

## Customer Detail

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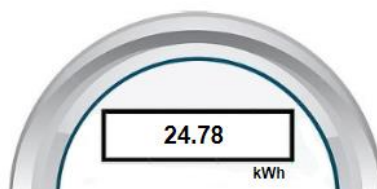


Connected

Recent Activity: ANSI Parsing received at 01:01:20 AM on March 14, 2023



## Last Read



Utility:	Electric
Multiplier:	1
Radio Type:	Nighthawk
Serial Number:	
Meter Number:	
Meter Form Factor:	09
Firmware Version:	3.61
Meter Status:	Installed

## Meter Activity

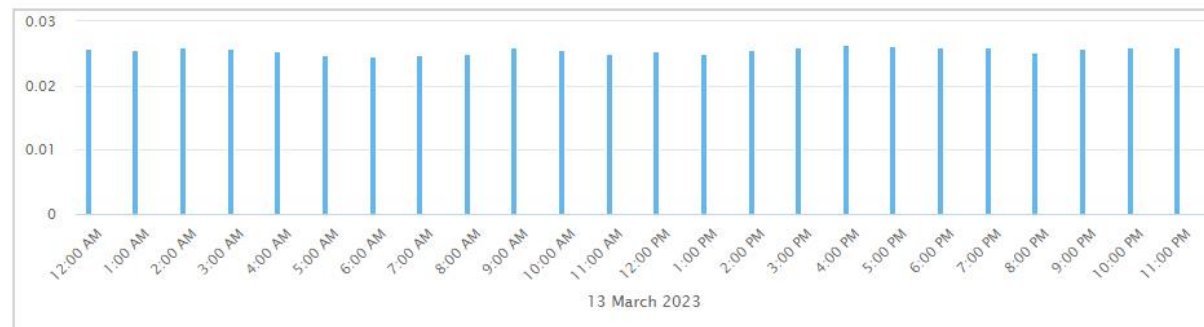
☒ Interval ☐ Daily ☐ Monthly ☐ Yearly

[Consumption](#)

[Outage](#)


[Device Map](#)


## Daily Consumption (kWh)





Estimated


# ZERO-INFRASTRUCTURE AMI


  
BILLING

  
OPERATIONS

  
CUSTOMERS

  
REPORTS

  
SYSTEM SETUP

  
USERS

## C&I Daily Snapshot

Start Date:  End Date:

Customer Number

Customer Name


Address

Meter Number

Serial Number

Show  entries

Filter

Read Date & Time	kWh Delivered	kWh Received	Prev Demand Reset Date	Prev Max KW Delivered	Prev Max KW Received	Max KW Delivered	Max KW Received	KVARH Lead	KVARH Lag	Prev Max KVAR Lead	Prev Max KVAR Lag	Max KVAR Lead	Max KVAR Lag	KVAH Total	Prev Max KVA Total	Max KVA Total
 03/12/2023 3:43 AM	23.607	0	01/01/1900 12:00 AM	0	0	0.049	0	0	123.983	0	0	0	0.232	168.6	0	0.305

Phase A Voltage 124.1

Phase A Voltage Angle 0

Phase A Current 0.3

Phase A Current Angle 65.1

Phase B Voltage 123.6

Phase B Voltage Angle 240.9

Phase B Current 0.3

Phase B Current Angle 334.8

Phase C Voltage 124.1

Phase C Voltage Angle 120.4

Phase C Current 0.5

Phase C Current Angle 201.4

Cautions None

Diagnostics Current Phase Angle Alert

Errors None



# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Program Specific Application
  - **Electric Cities of Georgia (ECG), GA**
    - Outcome:
      - Grown from 7 initial meters/locations to close to 200 (and growing)
      - System that's both easy to deploy, operate and maintain
      - Can easily access needed hourly and sub-hourly interval meter data
      - Can see almost instantly if locations are mis-wired from system dashboard
        - Speeds up troubleshooting / system roll out



## AMI | ADVANCED METERING

- Case Study – Program Specific Application
  - **Electric Cities of Georgia (ECG), GA**
    - Challenges/Lessons Learned:
      - Tracking meter inventory
      - Deployment process training







# ZERO-INFRASTRUCTURE AMI

## AMI | ADVANCED METERING

- Case Study – Program Specific Application
  - **Electric Cities of Georgia (ECG), GA**
    - What's next? :
      - Bi-directional/Solar metering for providers
      - Using same headend software - residential and polyphase



METERING LEADER SINCE 1904



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# QUESTIONS?



A TESCO COMPANY

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# TESCO HOSPITALITY SUITE

# You're invited...

We would like you to join us in the TESCO Hospitality Suite for networking and more discussions about metering. The discussion will not be exclusively metering.....but we love metering and that is the most common topic.

**TESCO Hospitality Suite – Brighton Tower**  
**Monday and Tuesday 8:00 PM – 10:00 PM**



**We Hope you Can Join Us!**

