



# AMI & ADMS Project Overview TEP Integrated Resource Plan

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October 17<sup>th</sup>, 2019



# Presentation Agenda

- Automated Metering Infrastructure (AMI) Overview
  - Implementation Drivers
  - AMI System Overview
  - Project Status
  - Project Schedule
- Advanced Distribution Management System (ADMS) Overview
  - Benefits
  - Key Milestones
  - Next Steps



# AMI Implementation Drivers

- **Business Benefits –**
  - Foundational technology
    - Will support Bill Redesign (Informational Demand), Smart City, Smart Homes and Volt-Var Optimization
  - Meters report back line side power status, voltage and phase information and renewable system voltage information
  - Automation for new service connects and disconnects
- **Customer Benefits –**
  - Customer can initiate and receive faster service connect, disconnect and re-connect
  - Customer can receive improved outage and restoration information on their mobile devices (ADMS)



# More Than Just A Meter



## Energy

- kWh – Delivered, Received, Net
- Demand, Time of Use and Load Profile

## Billing and Operations

- Midnight self-read (default)
- 8-channel load profile (5, 15, 30 or 60)
- Minimum 45-days on board data storage
- Voltage, Temperature, Current, Reactive capable
- Alarm, Flag, Events

## Accessibility

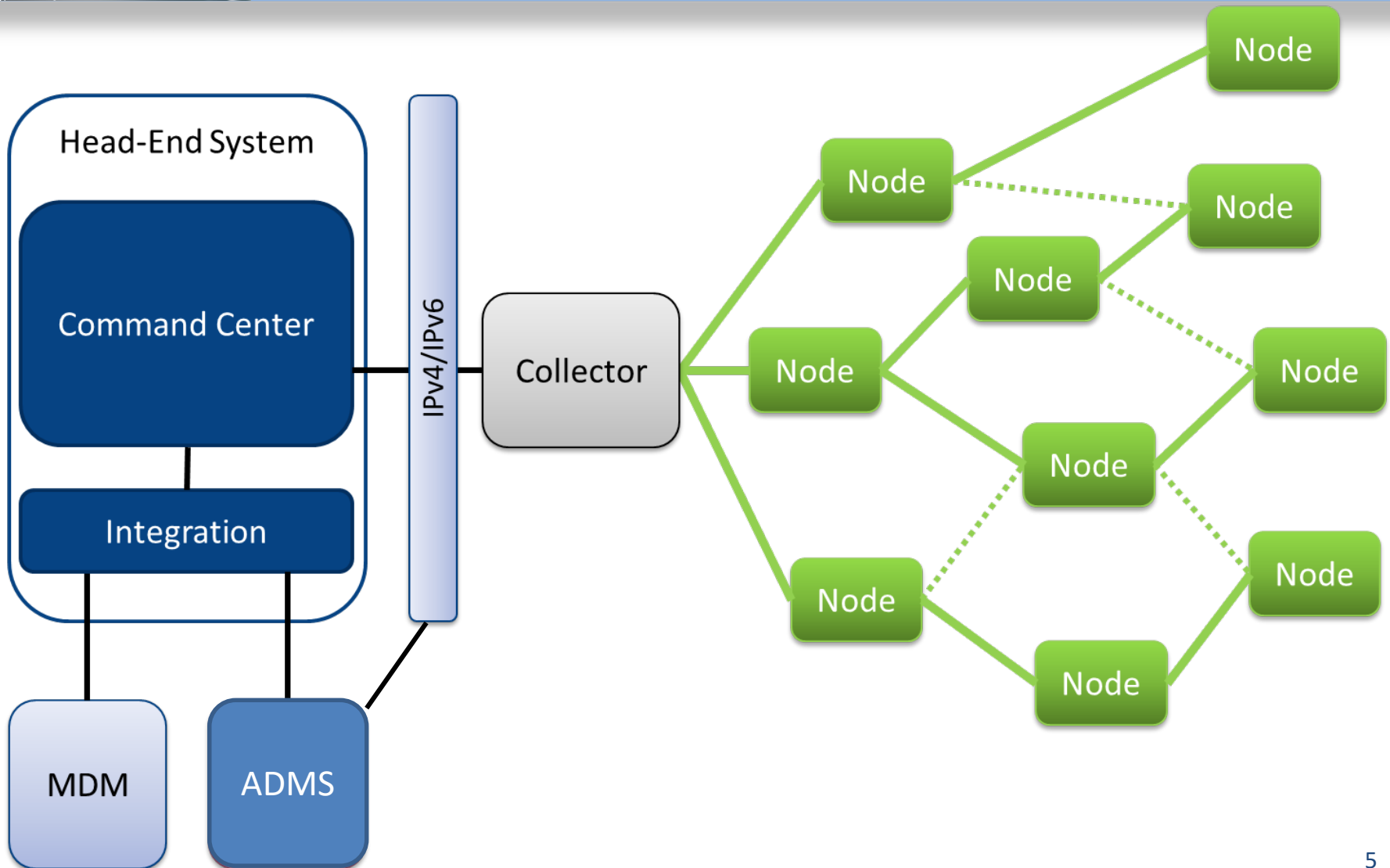
- Remote Configuration, Programming & Firmware Upgrade
- ANSI C12.19 Table Access

## Applications

- Single phase ANSI Forms
- Single phase - 120V and 240V
- ZigBee – Home Area Network communication



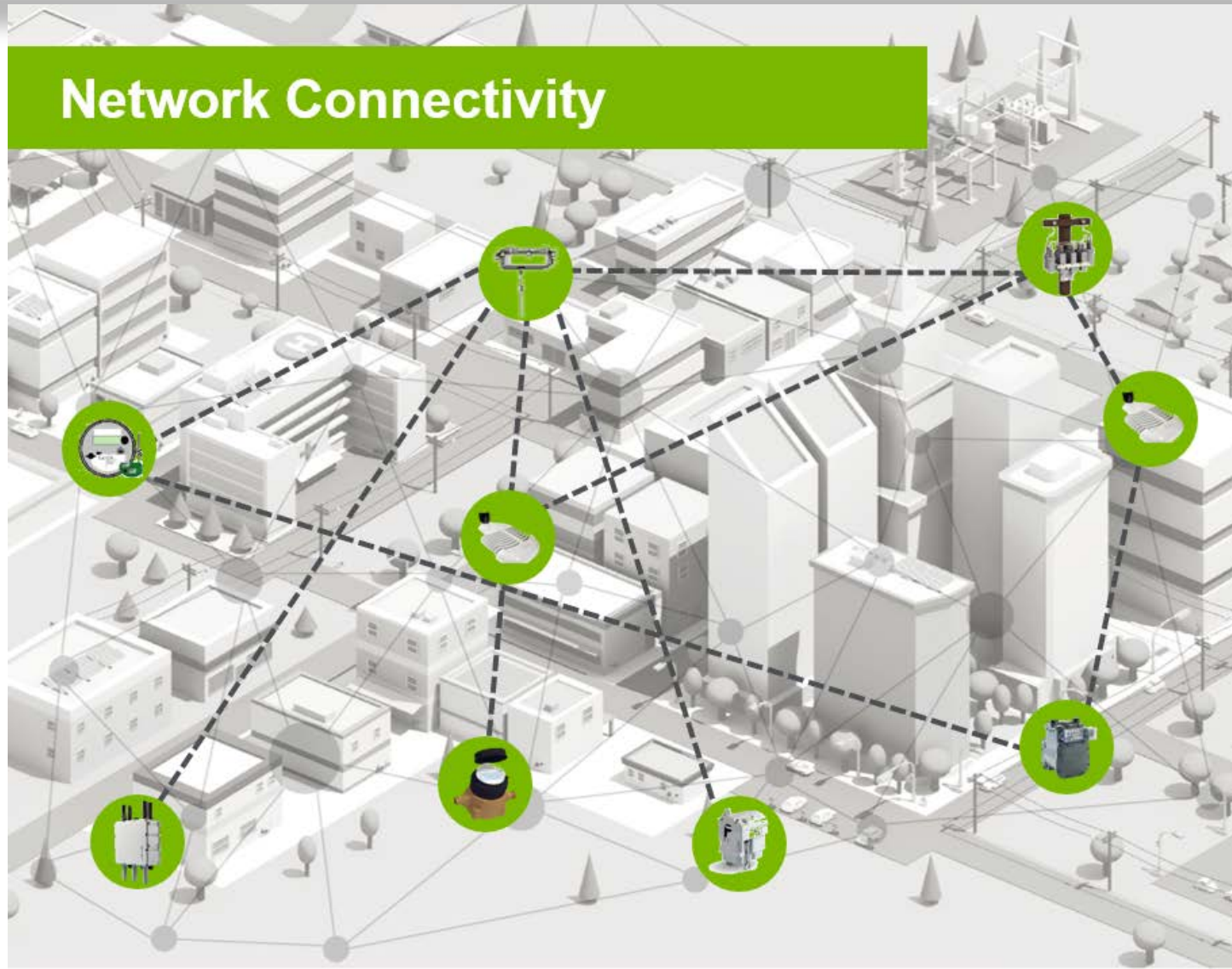
# AMI System Overview





# What are Nodes

## Network Connectivity



-  Gateway/Collector
-  Router/Repeater
-  Electric Meter
-  Gas Module
-  Water Module
-  Distribution Automation
-  Street Lights

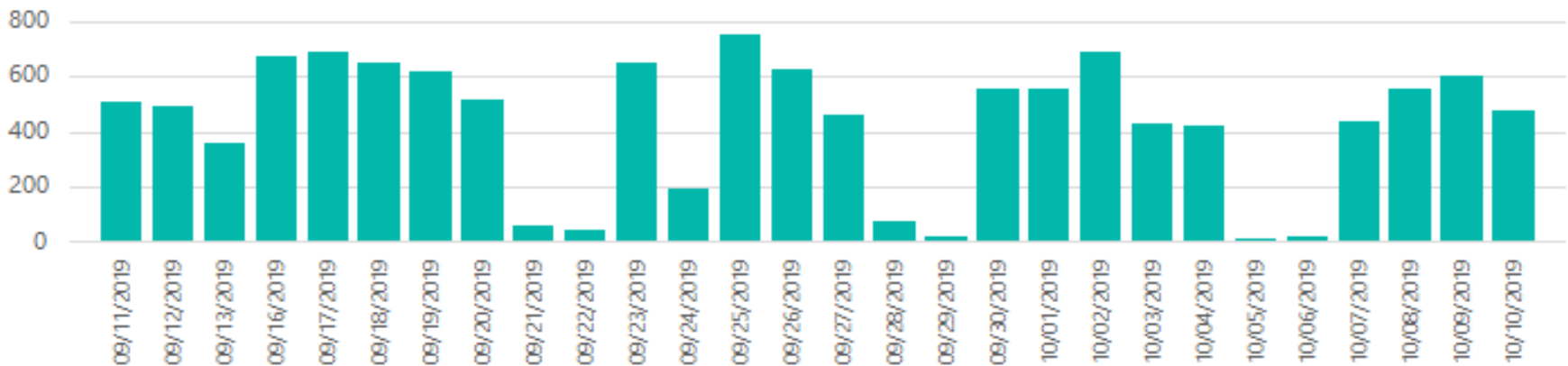
- Advanced security
- IP standards-based
- Wi-SUN future-ready



# AMI Project Status

- As of 10/3/19 we have installed 100,000+ AMI meters!
- Anticipated Completion 2022

**AMI Meters Installed Per Day**



Install Analysis					
	Yesterday	Last 7 Days	Last 30 Days	YTD	All
Total Installed	479	2,962	12,579	95,995	104,156
Daily Average	479	423	419	339	



# ADMS – What is it?

- Advanced Distribution Management System
  - Real-time operational visibility – Operator Situational Awareness
  - Control/monitoring & outage management
  - Supports grid automation & optimization
  - Advanced analysis of current grid conditions
  - Foundation for Distribution Modernization projects
- All distribution field data leads to ADMS
  - Substation SCADA, AMR/AMI Meters, Grid Sensors & Field Device Controllers
- Future management of Distributed Energy Resources
  - Demand Response (DR)
  - Distributed Energy Resource Management (DERMS)





# ADMS Project Benefits

- Improved distribution grid reliability
  - Proactive optimization of grid resources
  - Power flow visualization/voltage control
  - Fault location/short circuit analysis
- Increased asset utilization
  - Improved load balance/extending asset life
  - Prioritized maintenance/system reinforcement
- Increased customer satisfaction
  - Improved reliability/power quality
- Simplified operations system
  - Common application user interface & user/support training
  - Standardized support team skill sets
  - Shared hardware platforms



# Business Benefits

- Evolving the capability of the distribution system
  - Voltage optimization & system reinforcement prioritization
    - Coordination of voltage control devices
      - Load Tap Changers/Capacitor Banks/Regulators & Inverters
    - Optimize Distribution Energy Resources
      - Compensate for growing Distributed Energy Resource production using forecasts
      - Defer/Reduce traditional distribution circuit upgrades by optimizing existing system
    - Use ADMS for select “behind the meter” equipment as a bridge to a future DERMS solution



# Key Milestones

- October & November
  - Start User/Operator/DOCS Training
  - Finish Site Acceptance Testing
  - Parallel Operation
- December and January
  - User Acceptance Testing
  - TEP/UNSE Go Live



# Next Steps

- More field devices for ADMS
  - Researching the use of the AMI drop-in network for supporting communications for field devices
    - Line sensors
    - Capacitor banks
    - Street Light control
- DERMS system for integration of devices on the customer side of the meter
  - Efforts underway to create a multi-year roadmap for DERMS integration



# Questions

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