



## American Electric Power's Integrated Approach to the Smart Grid

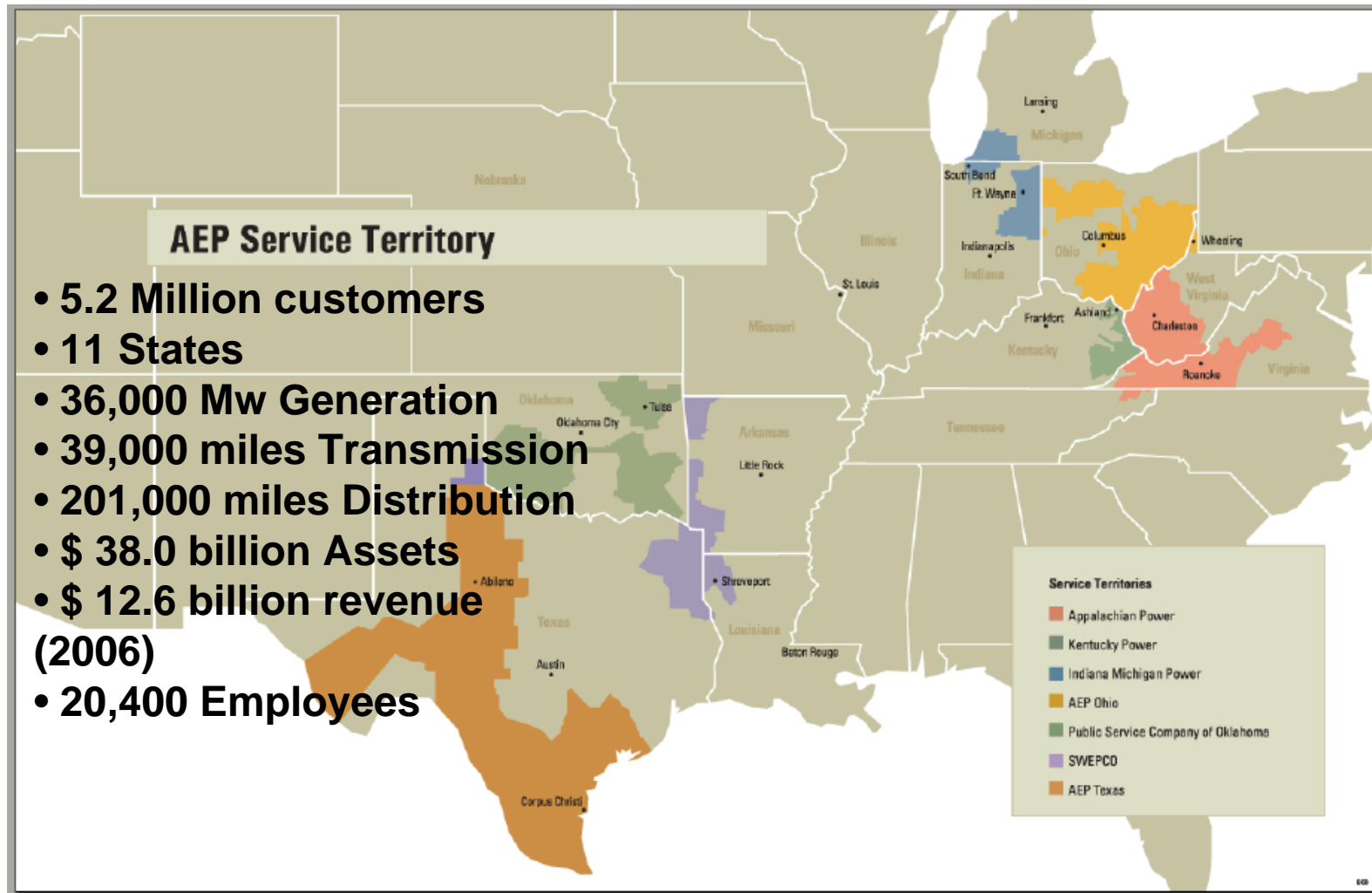
Presentation to  
Clemson Power Systems Conference  
March, 2009  
Tom Weaver – American Electric Power  
Ken Caird – General Electric



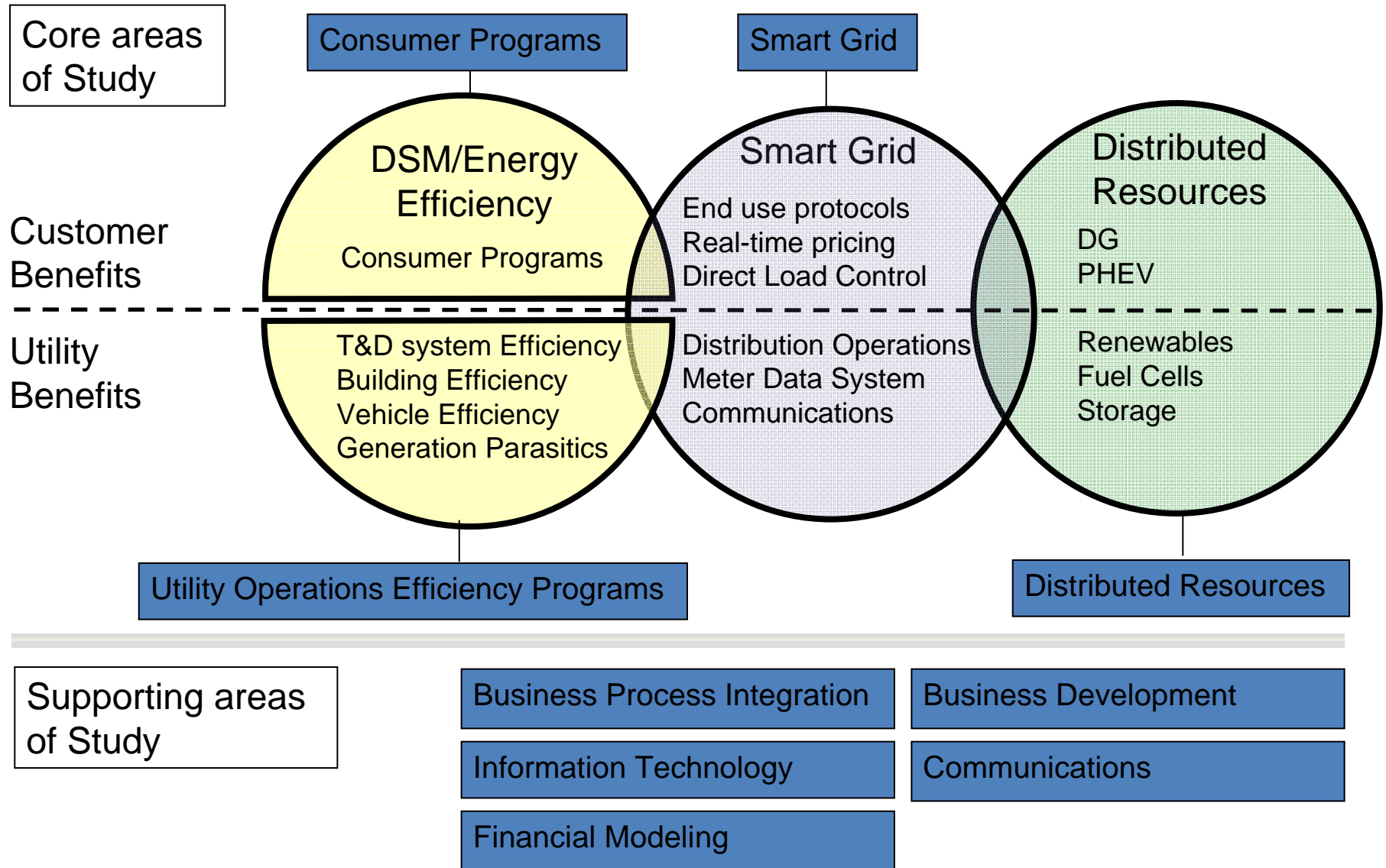
GE imagination at work



# AEP Statistics



# AEP's gridSMART<sup>SM</sup>



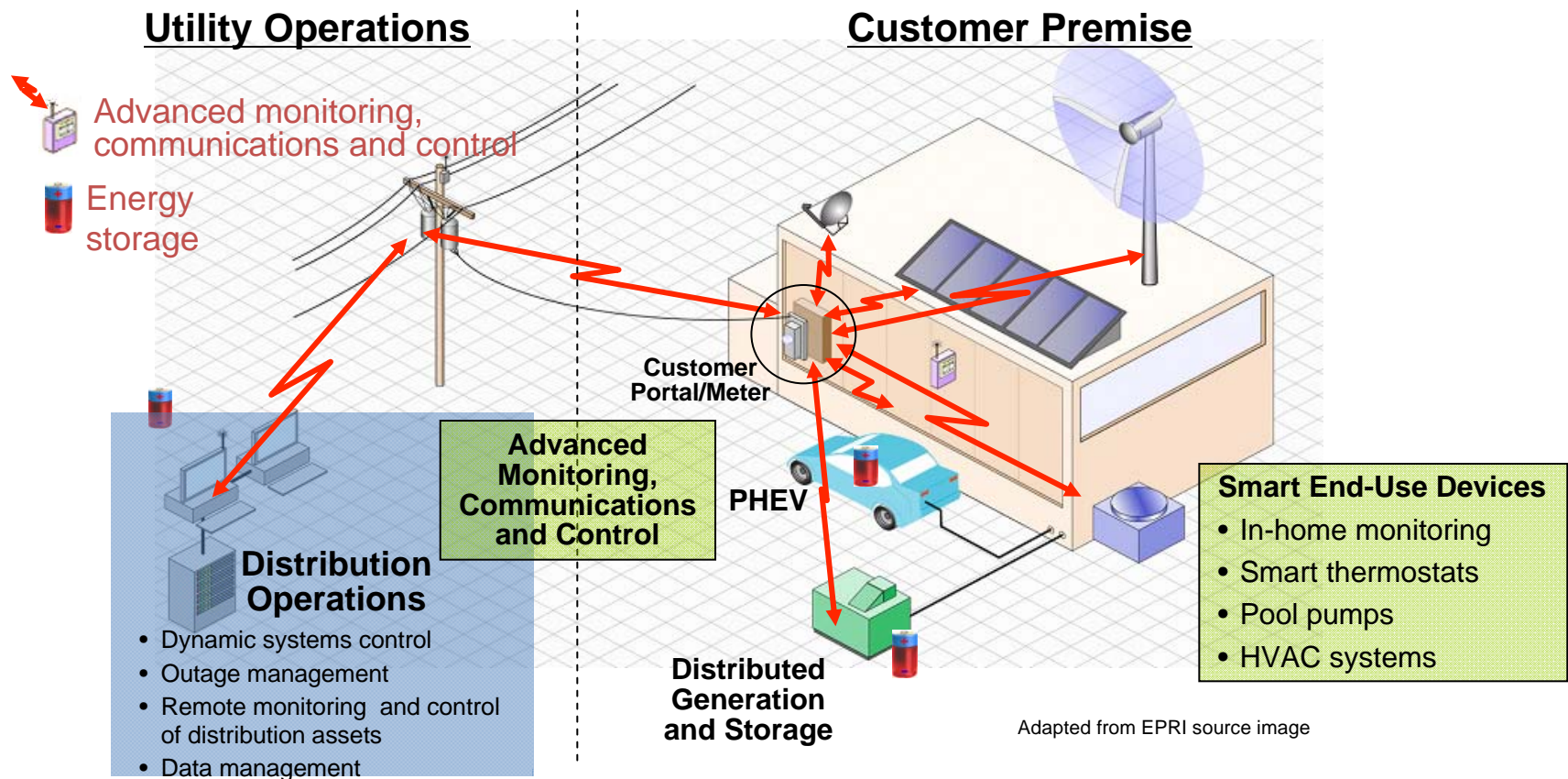
# What is **gridSMART**<sup>SM</sup>

A suite of customer programs and advanced technologies that will transport us into a new era of energy delivery and customer service. It includes **consumer programs** and **new energy delivery system technologies** that

- improve service quality and reliability,
- **integrate future generation and storage devices** that will respond to energy needs in the neighborhood and
- **advance AEP internal system efficiencies.**

# Future Distribution Operations

AEP intends to utilize technology at the customer's premise and throughout the distribution system to reduce demand, improve energy efficiency and improve reliability.





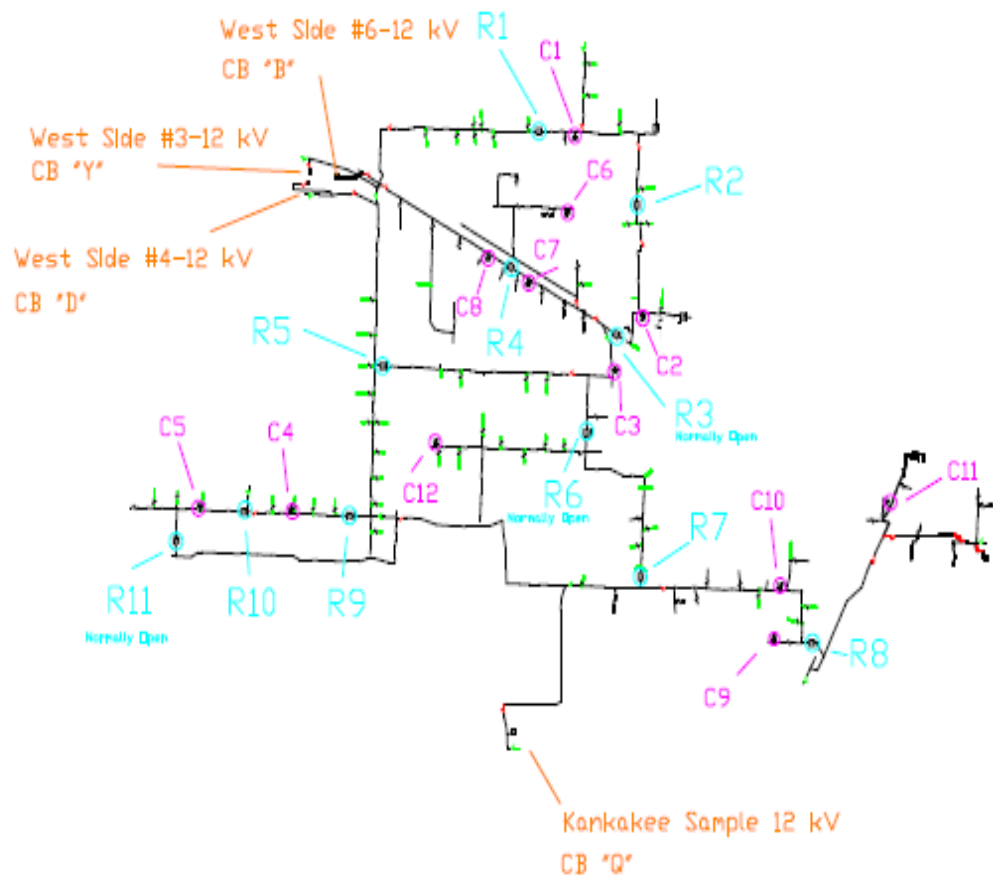
# South Bend Model City Demonstration

- AMI 10K Meters
- Utilizing Common Communications Infrastructure for AMI and Grid Management
- Manage 25 reclosers and 25 capacitors
- Utilize GE DMS as DSCADA host
- Integrate DMS with existing GE OMS and new AMI infrastructure
- Software integration utilizing Common Information Model (CIM) in coordination with EPRI

# South Bend Pilot Goal – Utilize Grid Management to Improve Reliability, Energy Efficiency, and Customer Experience

***Automated switches and reclosers can reconfigure the system to restore customers in un-faulted line sections***

***Automated Capacitor Controls can optimize power factor and report capacitor availability***



# gridSmart<sup>SM</sup> Architectural Requirements

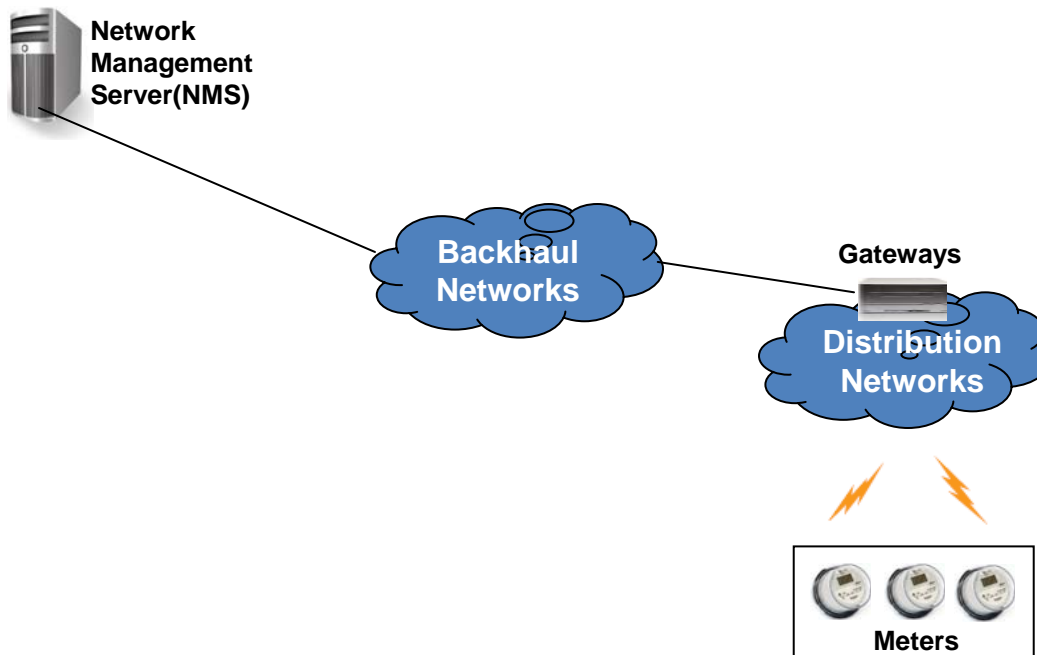
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- Current Landscape... “Our major systems are a “patchwork quilt” of interfaces stitched together to support isolated work processes and manual data collection... (34 systems)”
- gridSmart ... “Our future system should be driven by our integrated business process changes, which will require new systems and redesigning the way our systems integrate”
  - Leverage legacy systems as much as possible
  - Industry standards based interfaces and messaging structure
  - Common data model
  - New Systems & applications to meet gridSmart objectives



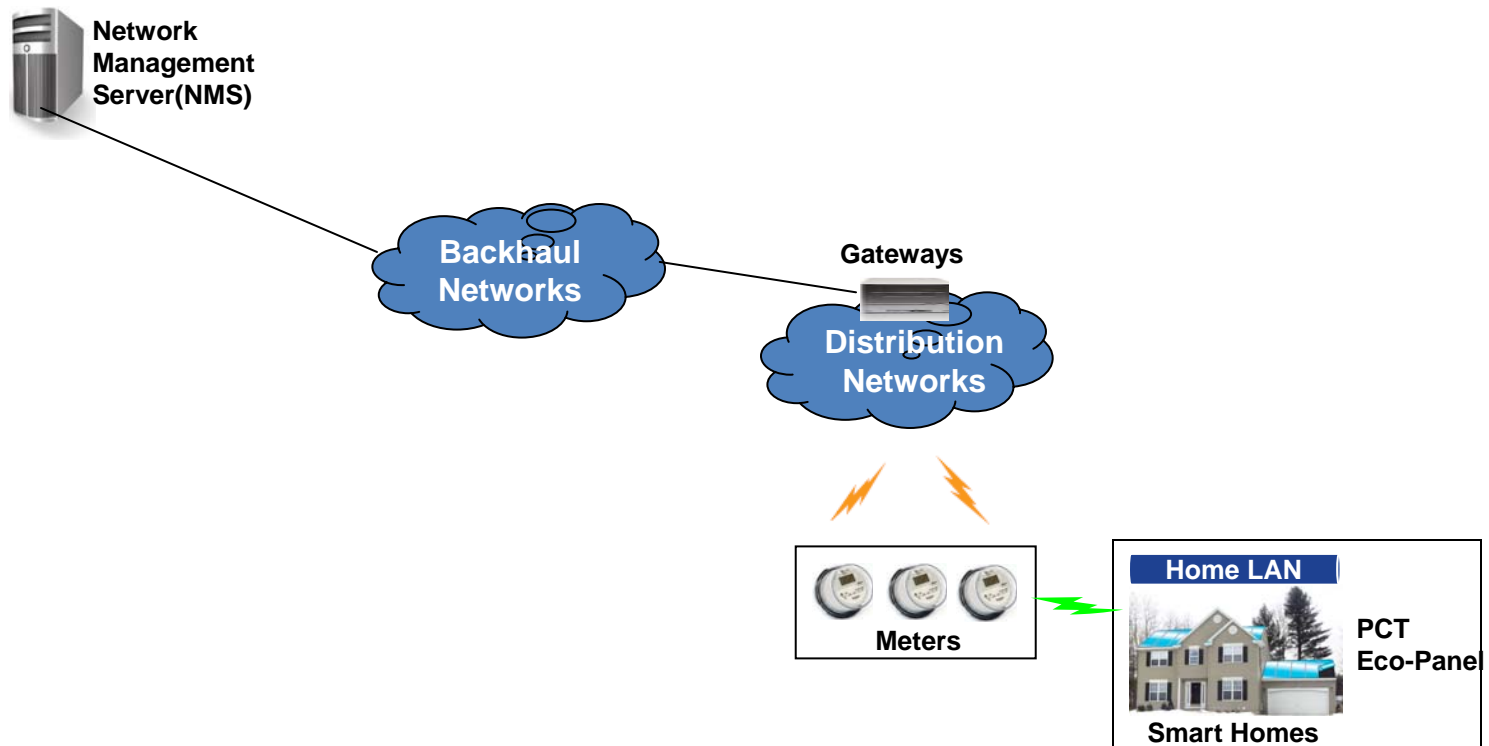
# AEP Architecture – Step #1 AMI

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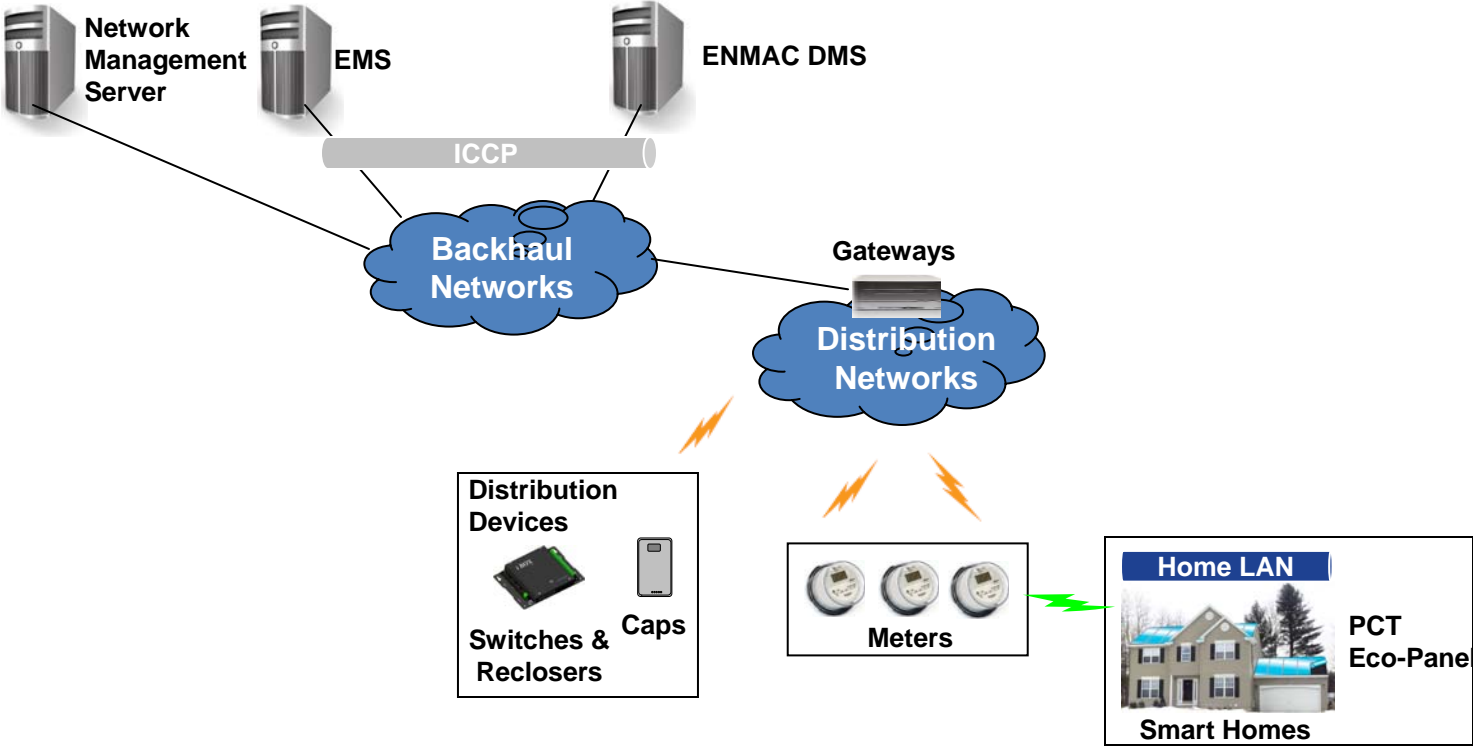


# AEP Architecture – Step #2 Smart Home

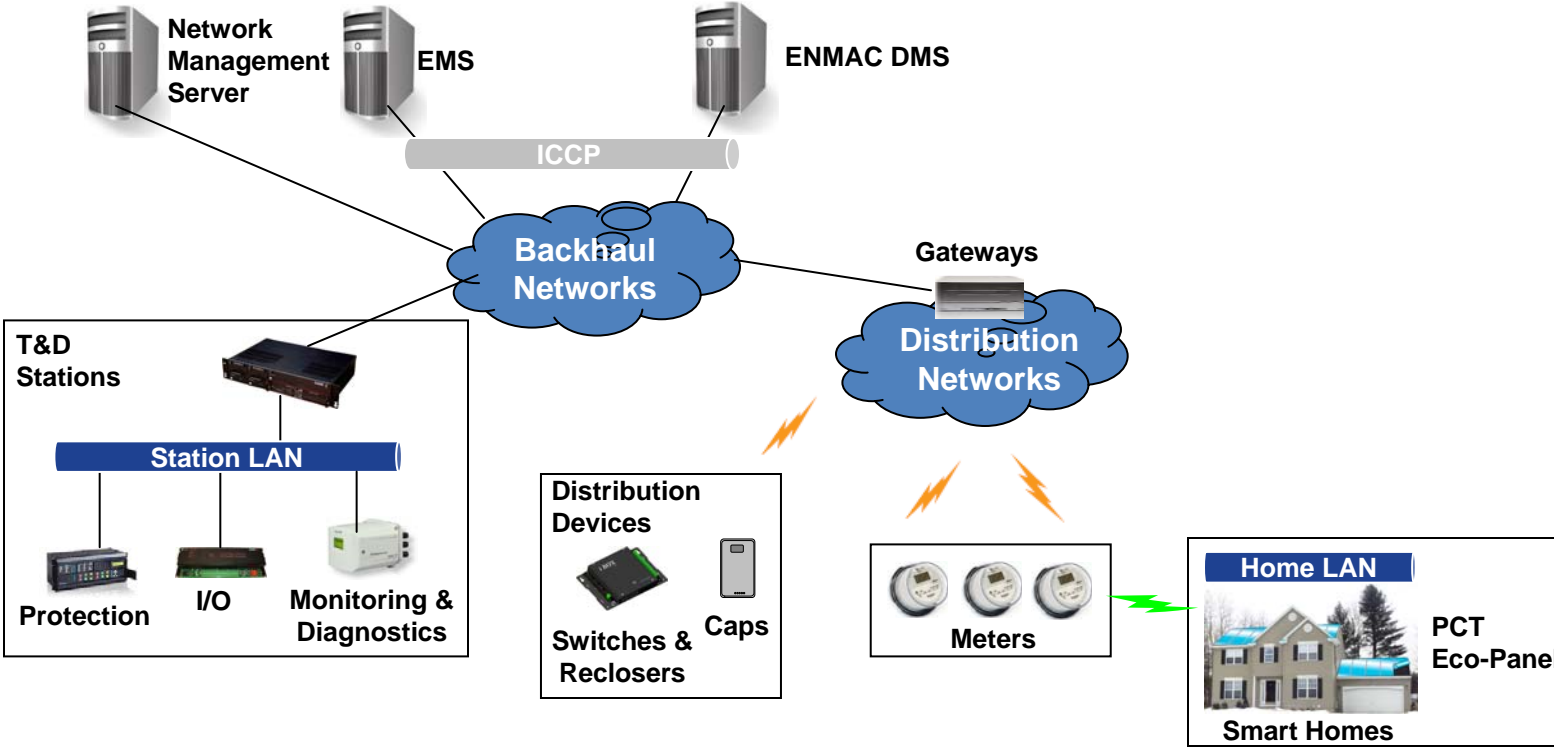
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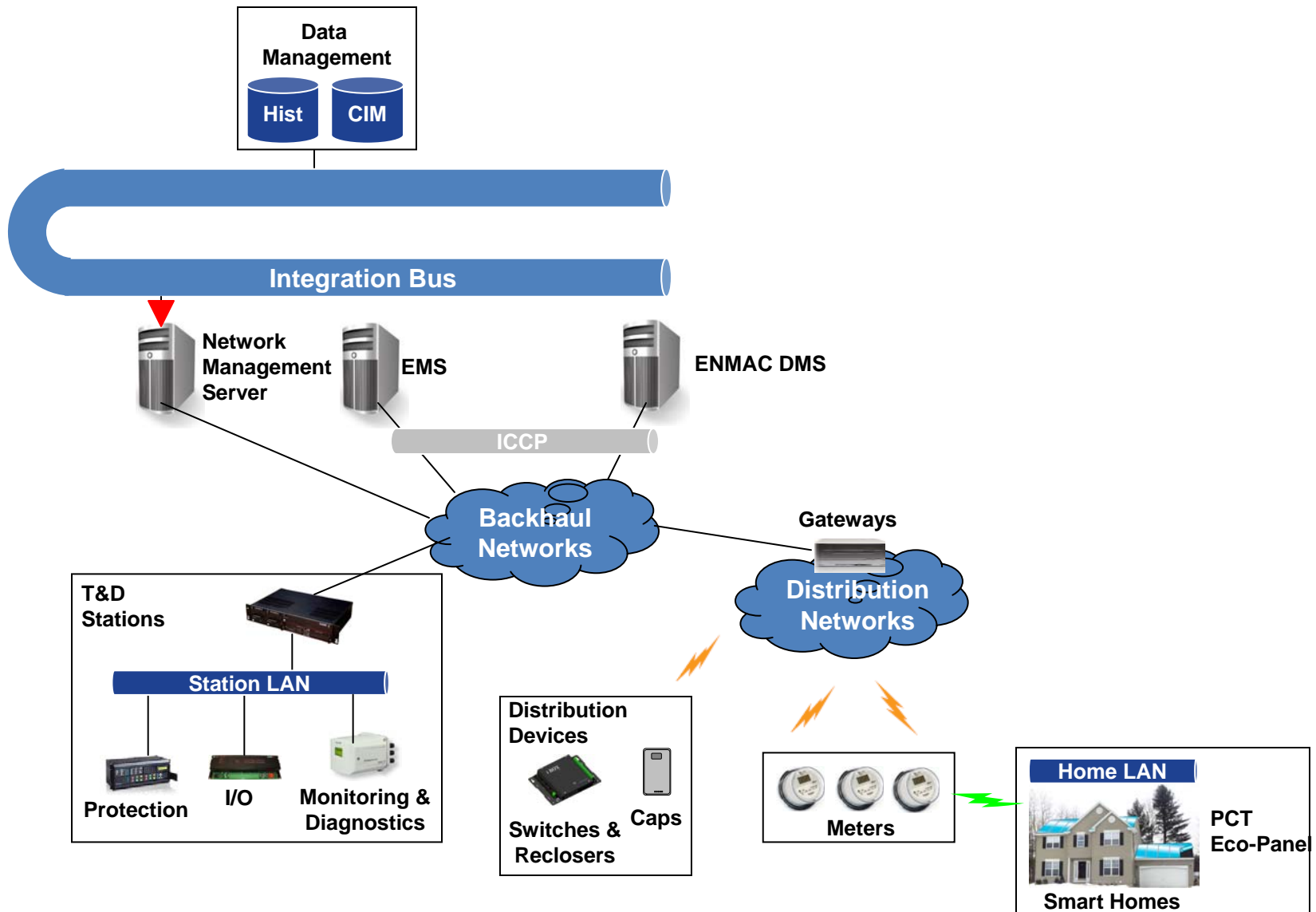
# AEP Architecture – Step #3 DA



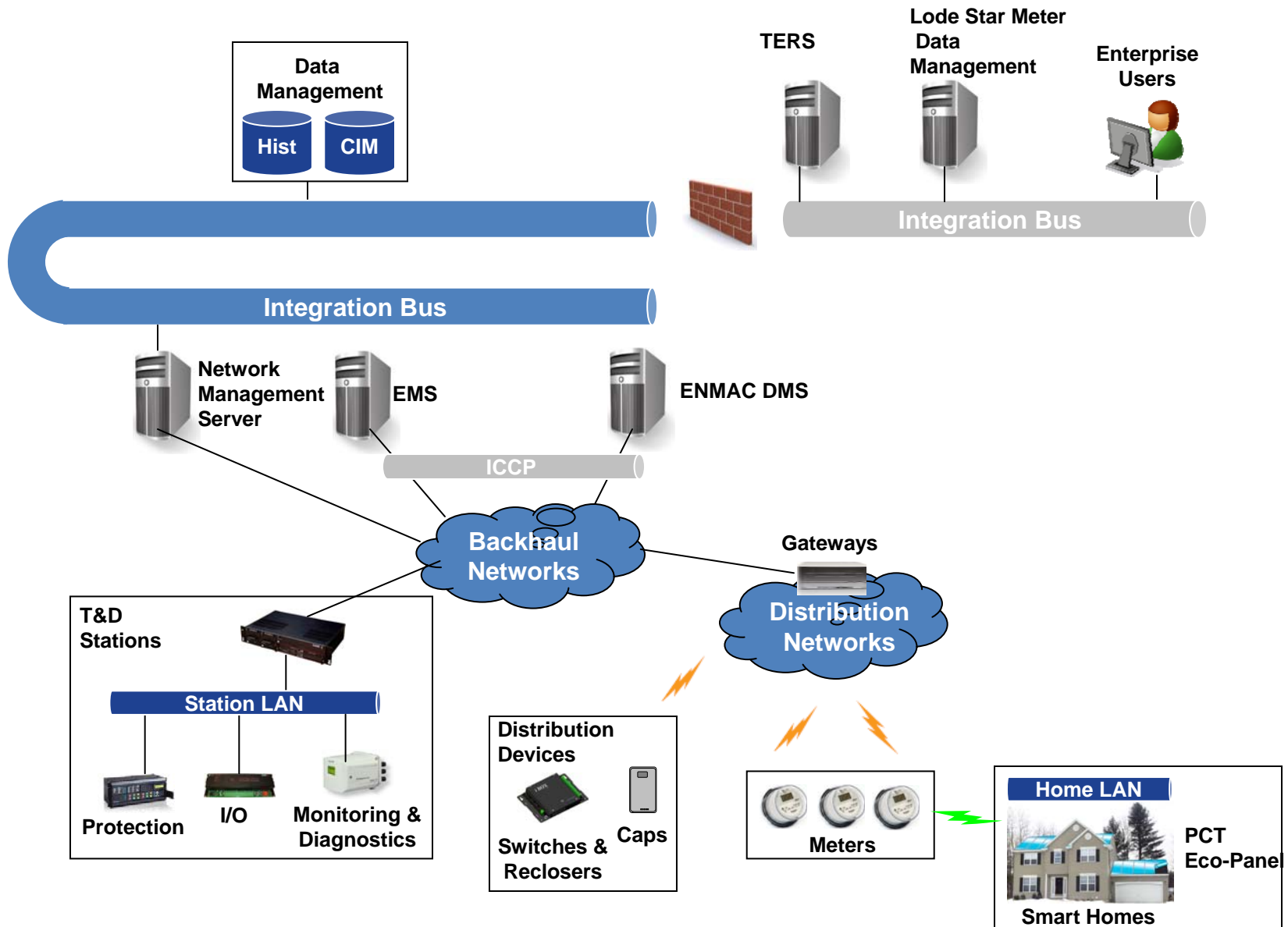
# AEP Architecture – Step #4 Substation Automation



# AEP Architecture – Step #5 CIM

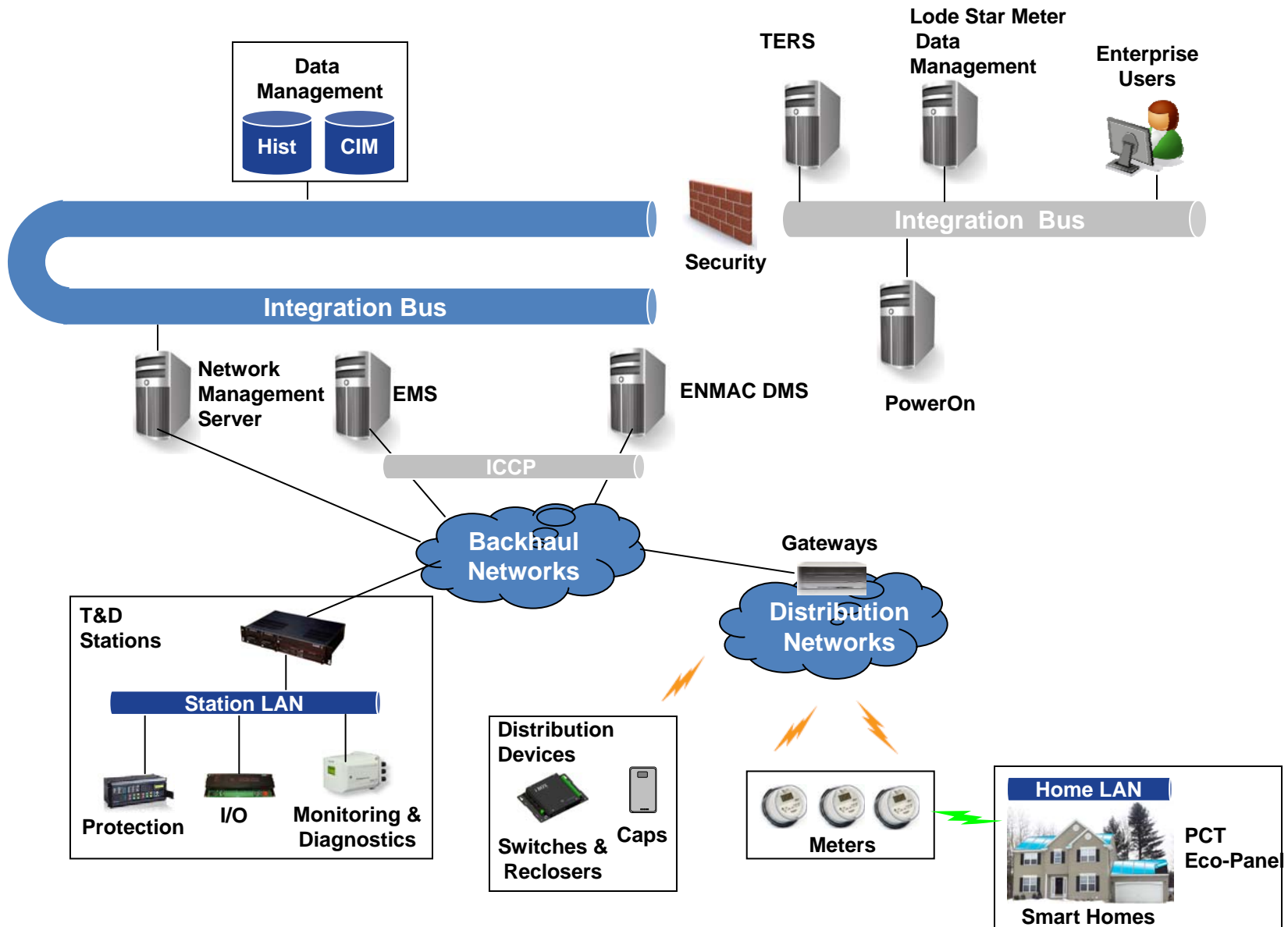


# AEP Architecture – Step #6 TERS & MDM Interface

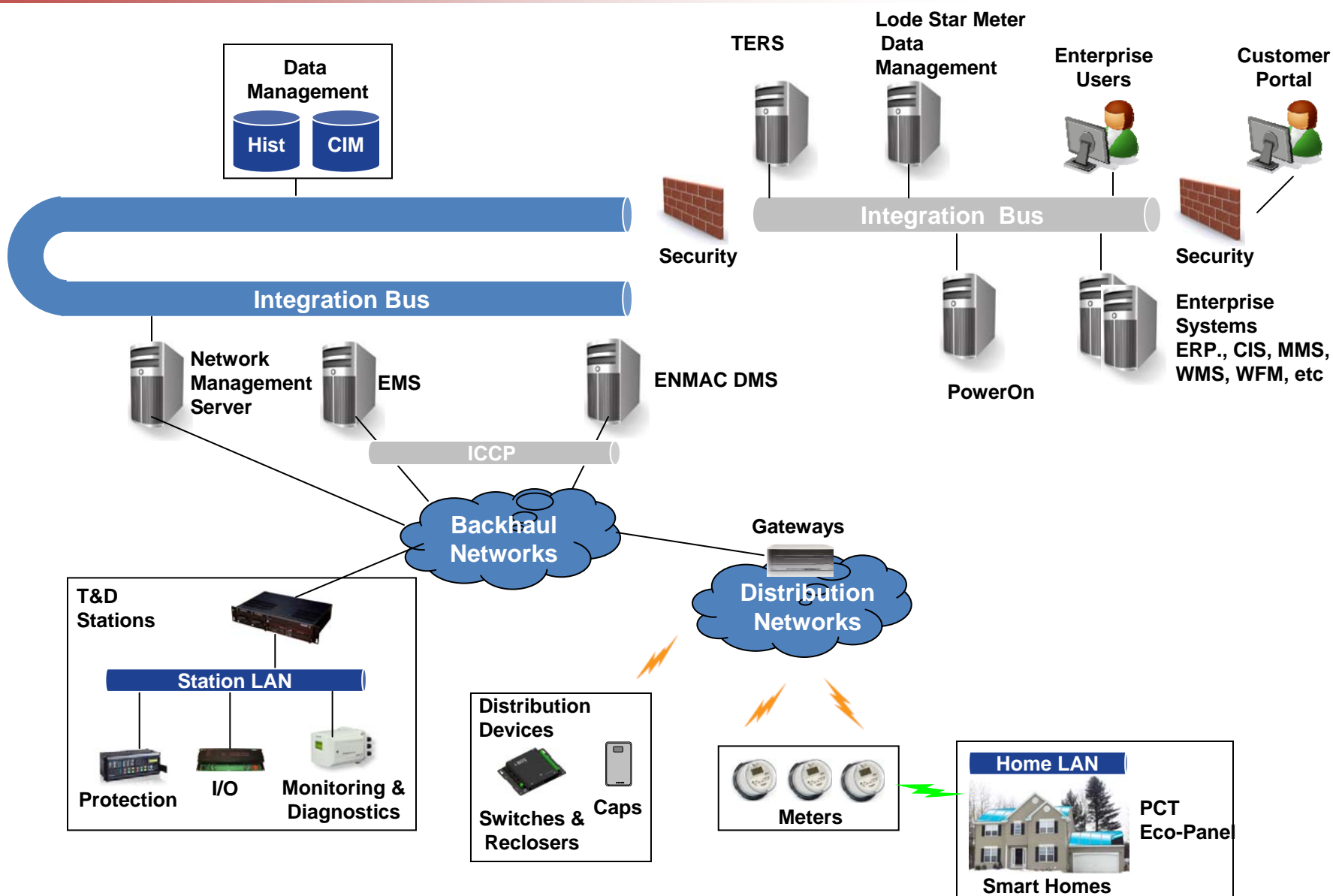




# AEP Architecture – Step #7 Power On

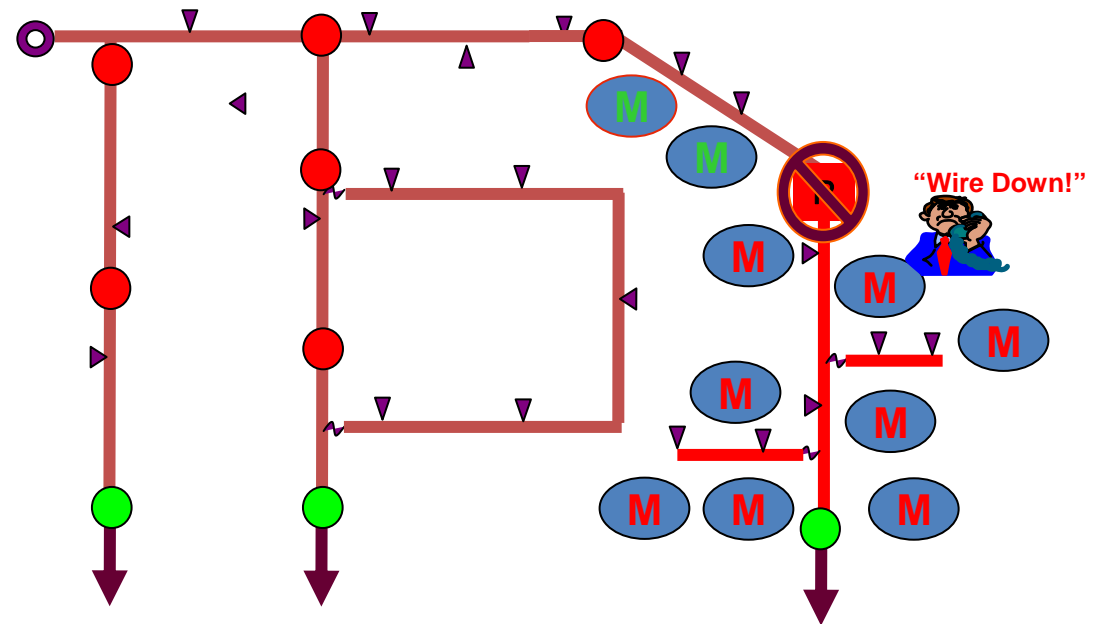


# AEP Architecture – Step #8 Enterprise Interfaces



# System Integration Goals

- Improve timeliness and number of outage notifications received by using meters as initial outage notification
- Improve the accuracy of predicted device analysis for non-SCADA outages
- Use meter up notifications as the restoration time for partial & full restoration times
- Eliminate crew responses to non-utility problems using power up results & meter ping capabilities
- Auto-detect and respond to nested customer outages as larger scale outages are restored



- Integrate AMI and Interrupting device data for use in OMS time stamps and reliability statistics

# Grid Management Goals

- Assess ability to utilize a common communication infrastructure for AMI and Grid Management
- Integrate the results of auto-restoration with a Distribution Management System (DMS)
- Provide Distribution Dispatchers full DMS schematic displays of entire feeder & all devices
- Integrate all feeder-level device operations with current OMS
- Provide remote capacitor monitoring & control
- Assess ability to improve reliability, energy efficiency, and customer experience

# Future Plans

- Complete Grid Management Projects that are part of Operating Company Reliability Strategies
- Include Grid Management in Model City Demonstrations and larger deployments as Regulatory support is achieved
- Continue development of Distribution Management System (DMS / GE ENMAC) to integrate SCADA, Power-On OMS, and AMI messaging.
- Include Integrated Volt/Var Control (IVVC) in Model City Demonstrations
- Add IVVC to existing DA Schemes where practical
- Deploy Grid Management where benefits justify. Examples include loss reduction, reliability improvement, and avoiding higher cost projects to provide needed additional capacity.



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Questions?

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GE imagination at work

