

NIWeek Energy Technology Summit

Designing the Smart Grid

August 2–3, 2011 Austin, Texas



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Designing the Smart Grid

August 2–3, 2011 Austin, Texas

National Instruments
Green Engineering



Overcoming Technical Challenges Development of Smart Distribution Systems

Walter Bartel, PE – CenterPoint Energy
Director, Intelligent Grid

- **Chris LeBlanc – National Instruments**
- *Energy Segment , North America BDM*



Houston's Smart Grid:

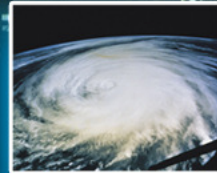
Transforming the Future of Electric Distribution & Energy Consumption

Walter Bartel

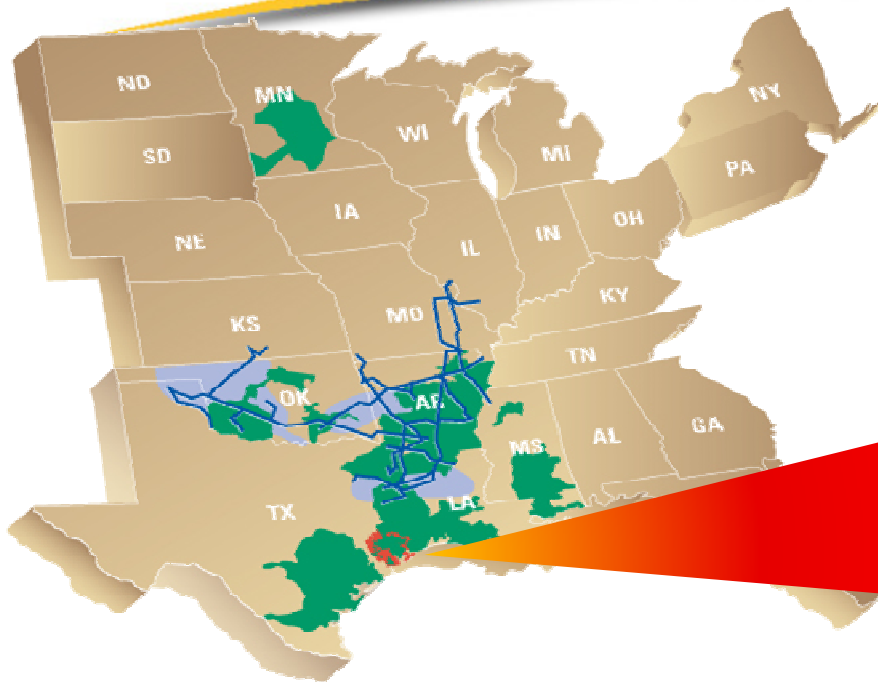
Director, Intelligent Grid

NI Week Energy Technology Summit

August 3, 2011



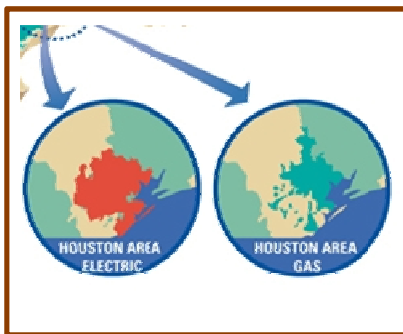
Who is CenterPoint Energy?



- Natural gas sales and delivery
 - Over three million residential, commercial and industrial customers in six states
- Competitive gas services
 - Over 12,000 commercial, industrial and wholesale customers across the eastern U.S.

Electric transmission and distribution

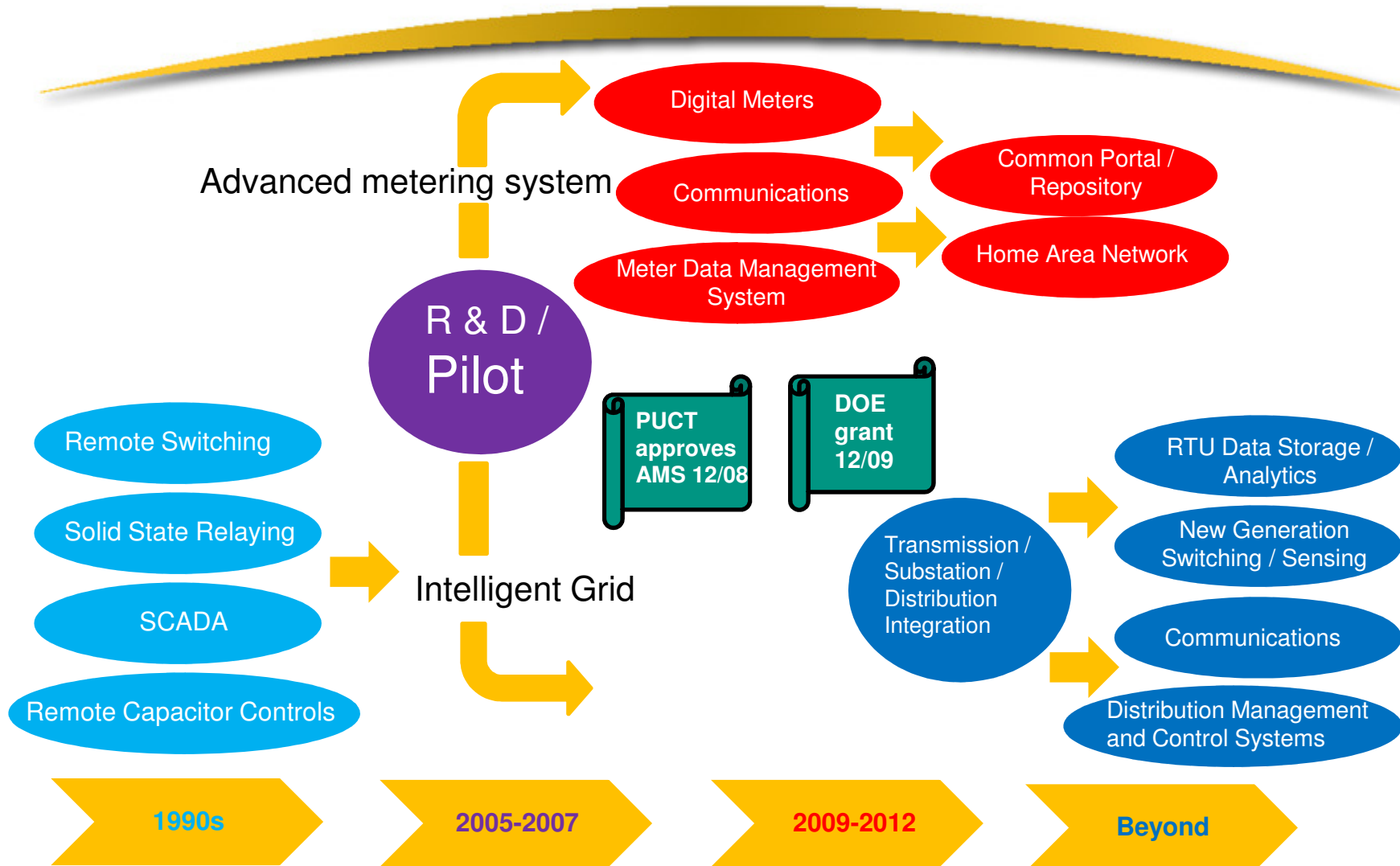
- Over 2 million meters in the Houston area
- 16.4 GW peak demand
- Interstate natural gas pipelines
 - Two pipelines in the mid-U.S., connecting to over 20 other pipelines
- Natural gas gathering and processing
 - 150 separate systems in major producing fields in Arkansas, Louisiana, Oklahoma and Texas



- Electric Transmission & Distribution
- Interstate Pipelines
- Field Services
- Natural Gas Distribution
- Competitive Natural Gas Sales & Services

CNP's smart grid journey

A history of stakeholder commitment

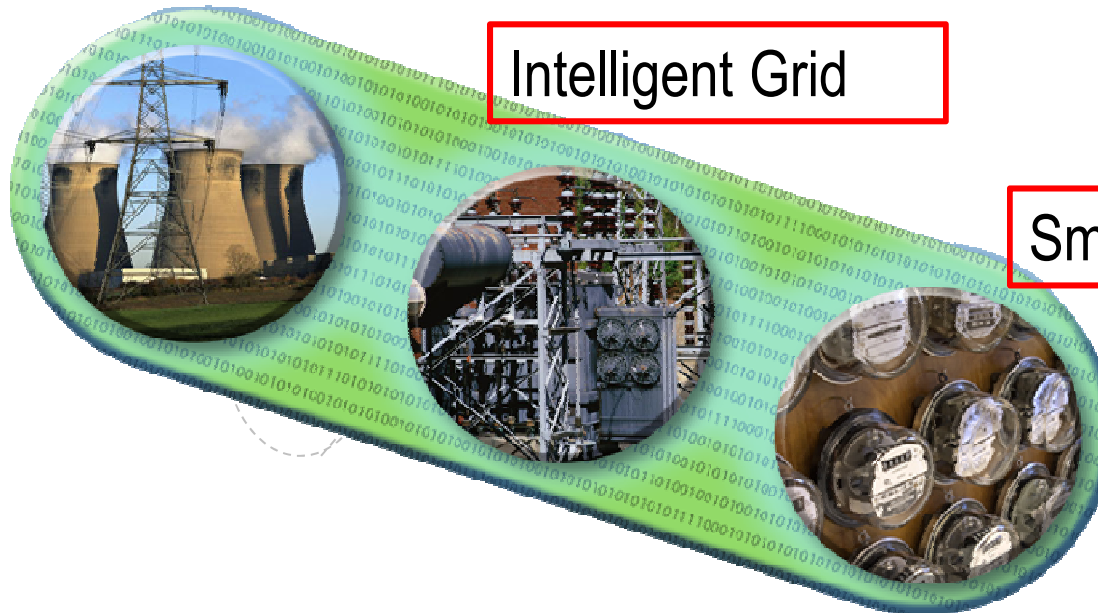


Three Components of a Smart Grid

Expanded Energy Sources

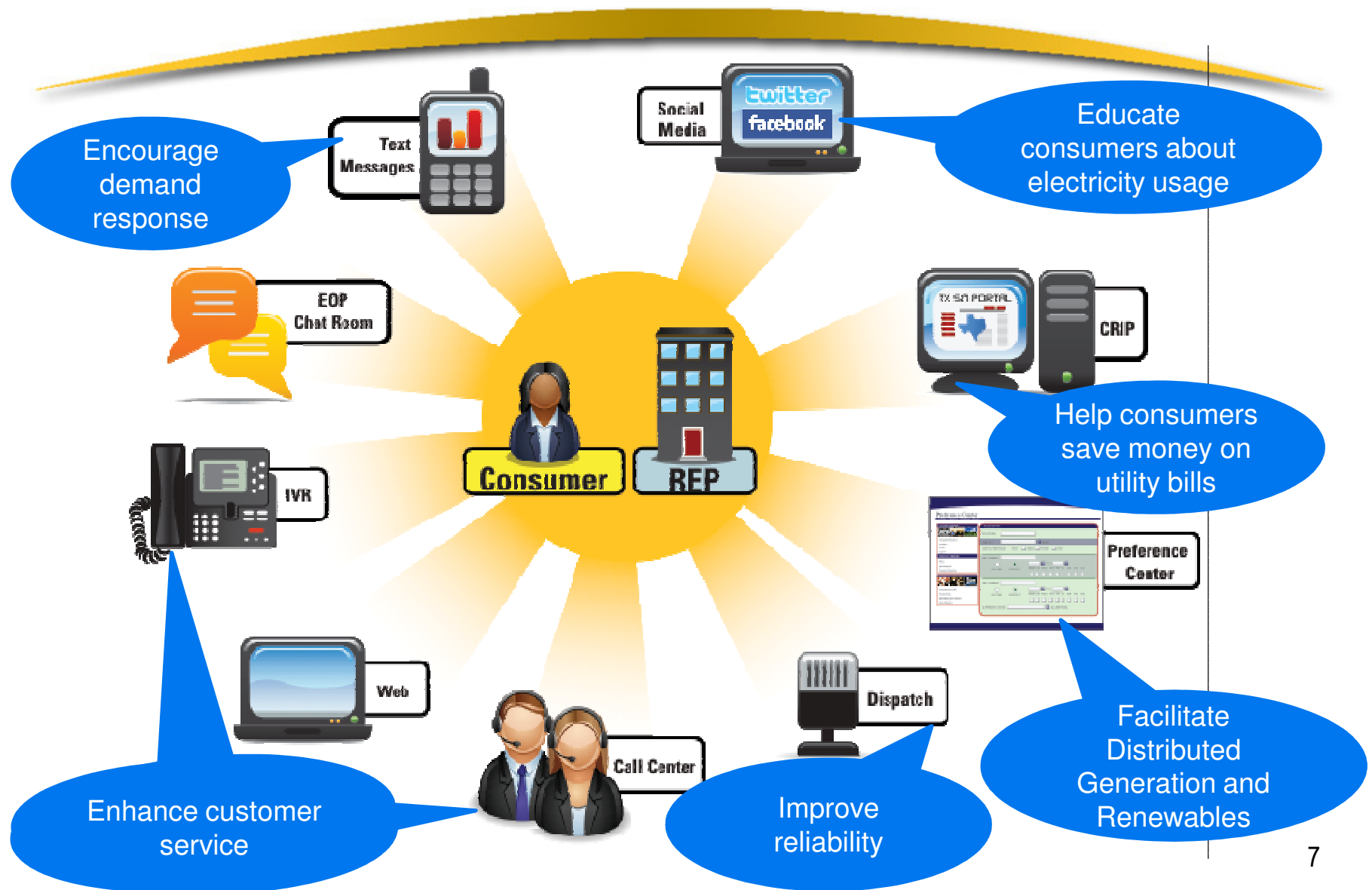


Intelligent Grid

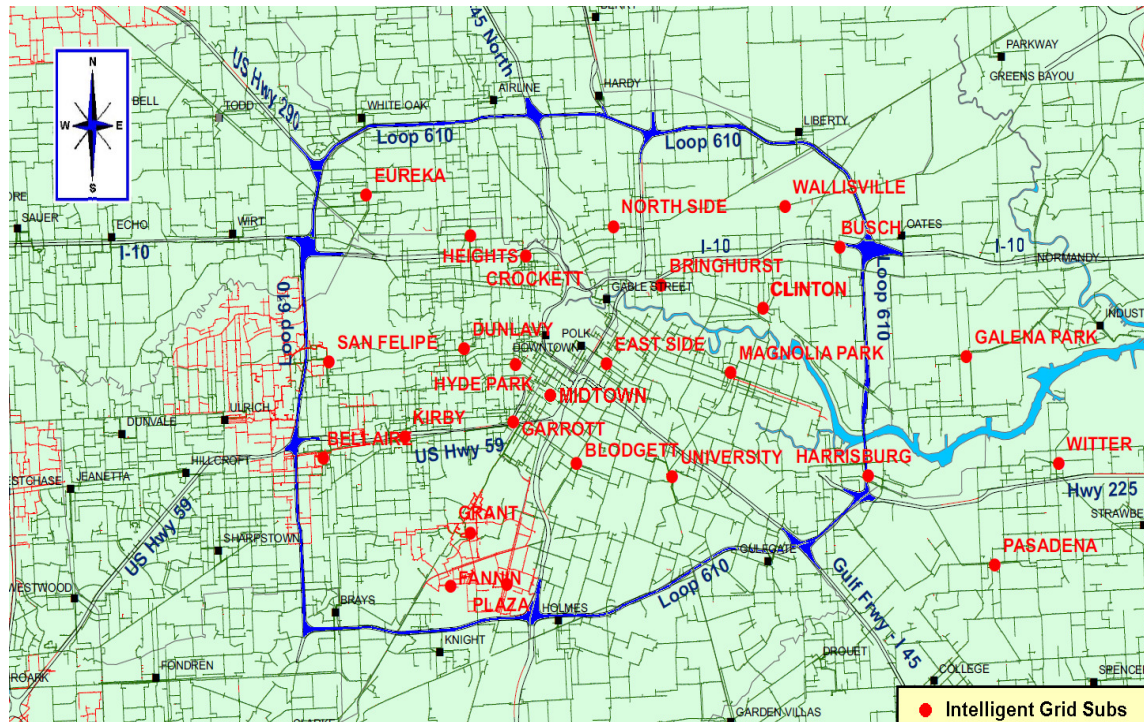


Smart Meters

The Customer is Central to Enable a More Robust Market



2010-2013 Deployment of the Intelligent Grid



- Implement an Advanced Distribution Management System (ADMS)
- Install remote monitoring at approximately 30 substations
- Install approx. 600 automated field switching and monitoring devices on approx. 300 distribution circuits.
- Integrate components to accomplish stated improvements (reliability, monitoring)

While this phase covers about 15 percent of CenterPoint Energy's service area, some of the improvements will benefit consumers in the entire system.

Design



Combined with back office computer systems, IG technology, when fully deployed, will automatically identify the location of power outages, isolate faulted sections of the grid and re-route power from other sources, essentially “healing” the system.

What Should We Do?

- Goal 1 – Detect fault
- Goal 2 – Isolate the faulted section
- Goal 3 – Locate the cause
- Goal 4 – Characterize fault type
- Goal 5 – Monitor Assets



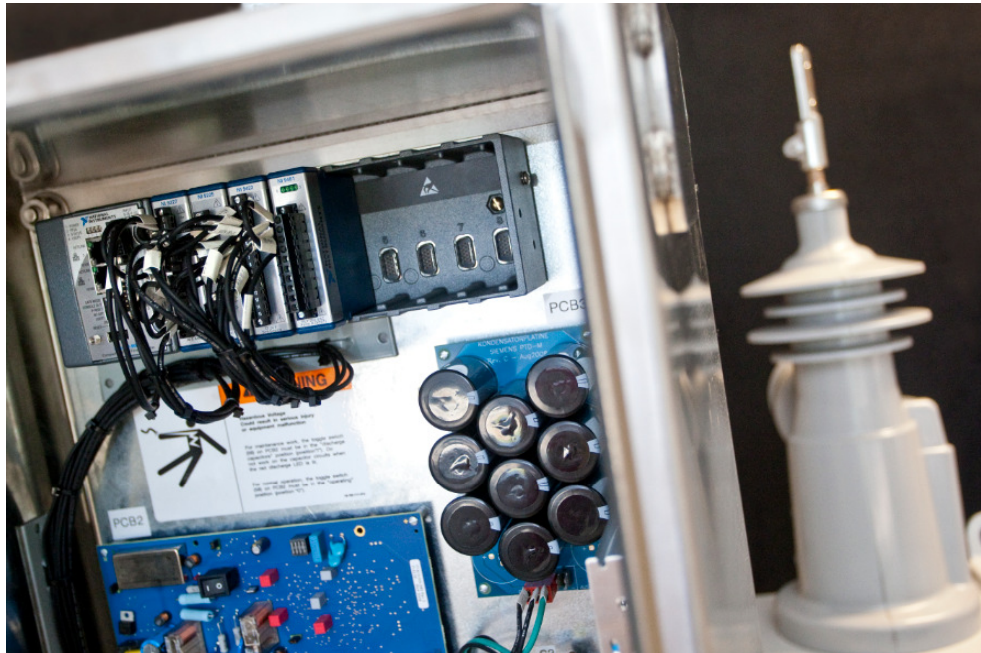
Intelligent Grid

How do we do it? With technology

- Accurate sensing
- High Resolution Event Recording
- Automated Switching Devices
- Remote Control Restoration
- Automated Fault location
- Fault characterization
- IG Self Diagnostics



Smart Switch



SIEMENS

- **NI-SGA brings advanced capabilities to Siemens SDR enclosure controller**
 - *Analytics + Switch Functionality*
 - *With optional future upgrades*

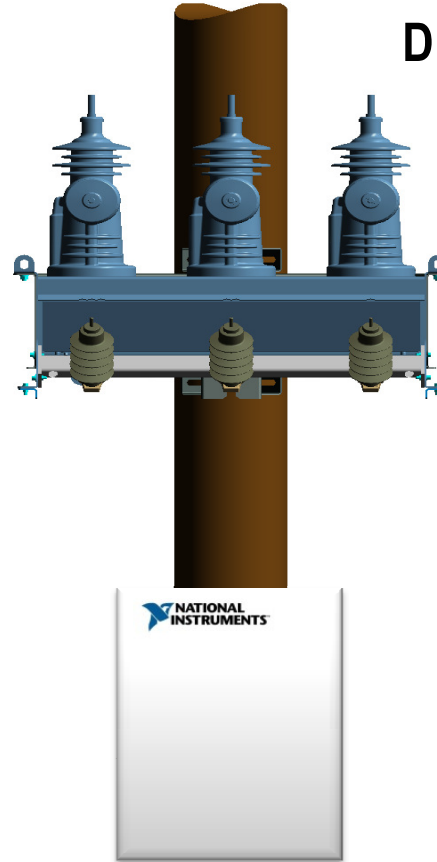
Smart Grid Smart Switch

Switch Controller

- Remote Switching
- DNP3 Protocol

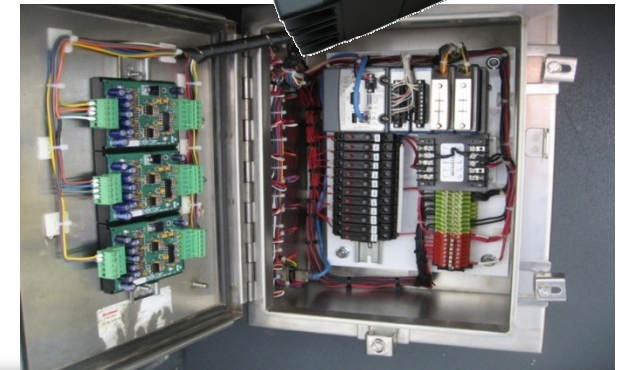
Analytics (NI SGA)

- 833 Samples/Cycle, 24-bit Resolution
- Advanced Embedded Analytics
- Data Storage, 1000+ event captures
- Remote upgrade
- Multi Protocol Communications



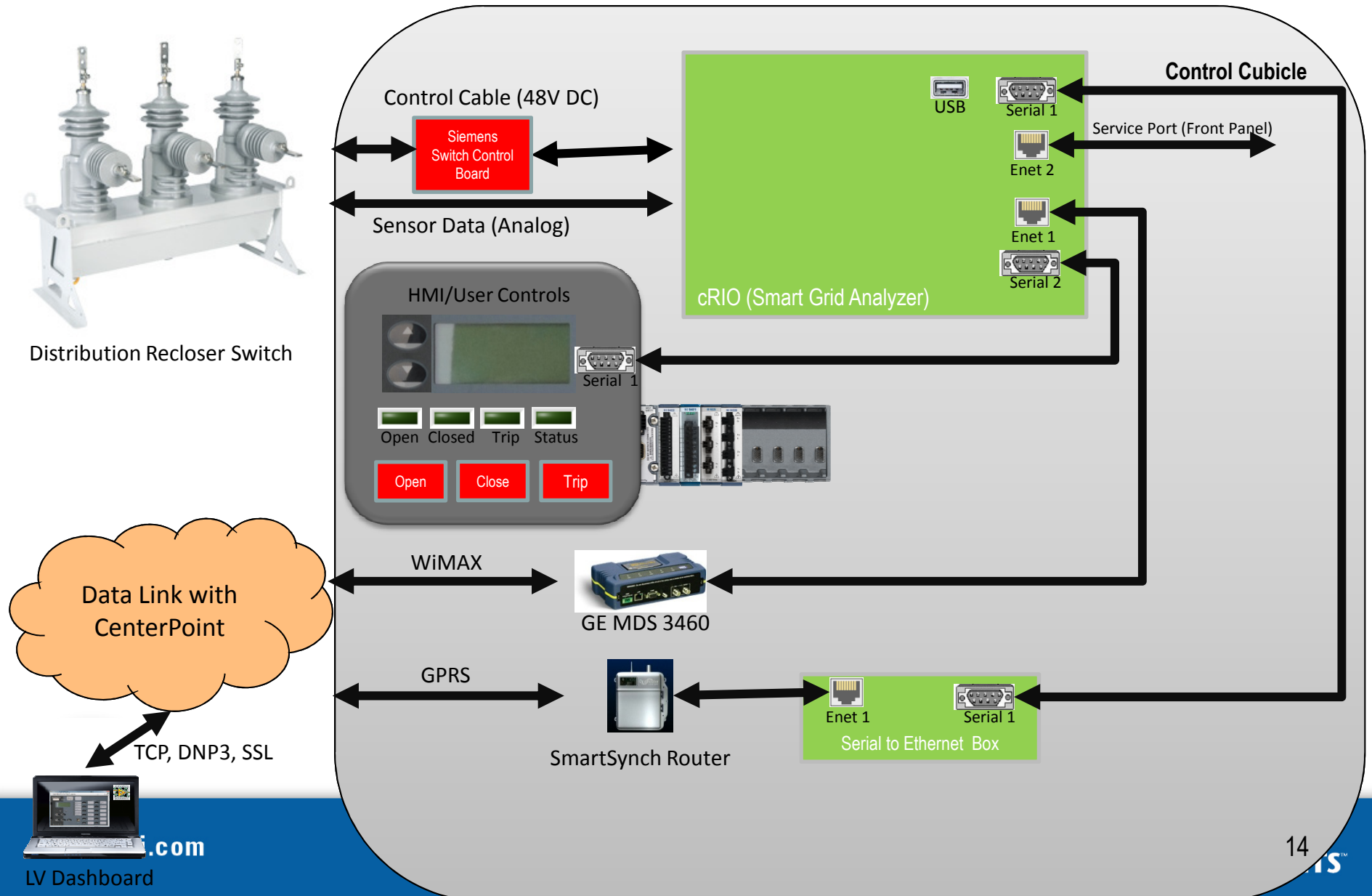
Distribution Switch

- Rated Through 38kV
- Vacuum Interruption Technology
- Integrated CTs & Voltage Sensors



SIEMENS

High Level Diagram



Summary

- **CenterPoint is in their 3rd decade of Smart Grid development**
- **Collaboration between utilities and high tech companies is key to Smart Distribution Systems**
- **Communications**
- **Data**
 - **SCADA data**
 - **Waveform data**

Department of Energy Disclaimer



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