CURRENT Smart Grid™ Overview

September 8, 2008

current®

Agenda

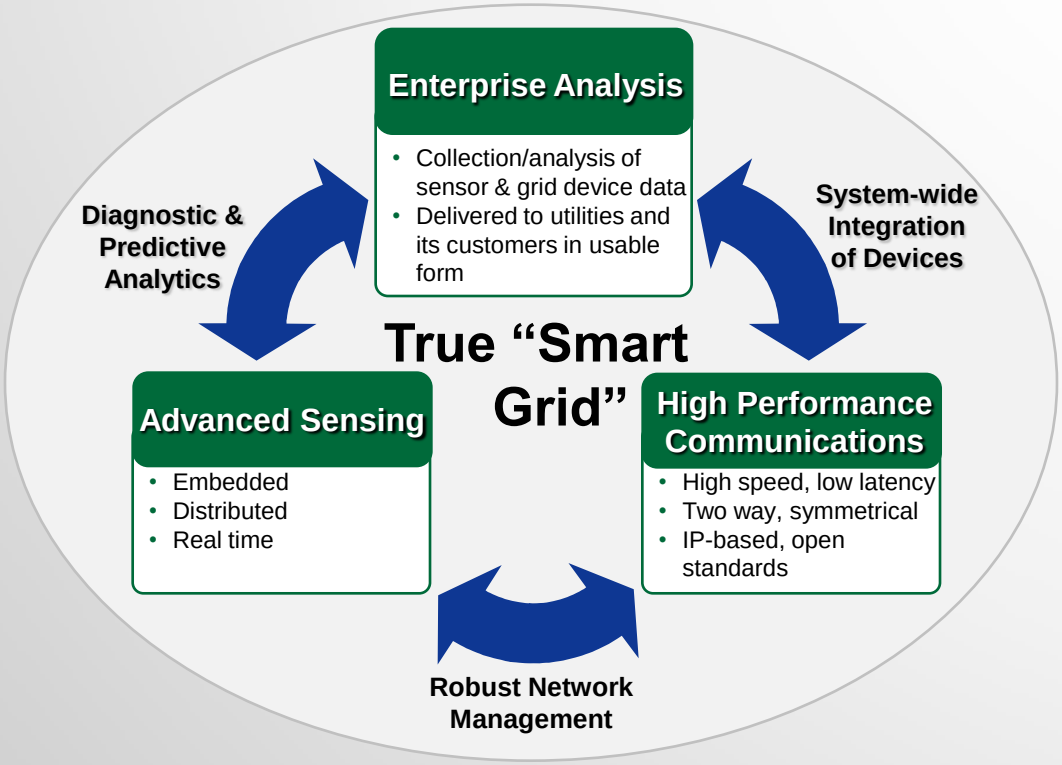
- **Smart Grid Here and Now**
- ***CURRENT Smart Grid™* Solutions**
- **Summary**

CURRENT Overview

- The leader in Smart Grid with Integrated communications, sensors and management and analytic software solution
- Largest U.S. Smart Grid services deployment in progress with **Oncor** (formerly TXU Electric Delivery)
- Selected as Global supplier for **AES Corporation** with initial deployment in São Paulo, Brazil where AES Eletropaulo services over 5 million customers
- Deploying Smart Grid City with **Xcel Energy**
- Working with **Iberdrola and EDF** in an EU funded program to develop European Smart Grid with a focus on wide-scale deployment of distributed generation, renewables and demand side management
- Winner of 2006 Red Herring's Top 100 Private Companies and 2006 Platts Global Energy Commercial Technology of the Year award
- Offices in Washington, DC, Rochester, NY, San Diego, CA & Zurich, Switzerland and offices in local markets where deploying – approximately 300 employees
- Investors include:

What is a Smart Grid?

"... a power system that can incorporate millions of sensors all connected through an advanced communication and data acquisition system. This system will provide real-time analysis by a distributed computing system that will enable predictive rather than reactive responses to blink-of-the-eye disruptions." (EPRI, emphasis added)



CURRENT Smart Grid

Emerging Issues require an Enterprise Solution Beyond AMI

Over last several years, utility executives and regulators have become increasingly concerned about multiple issues that can only be addressed through an enterprise wide smart grid solution

Cost and Uncertainty about New Generation and Transmission	**Environmental Impact**
Increasing Requirements for the use of Renewables and Distributed Generation	**Aging Workforce**

Smart Grid Enterprise Solution	**Enhanced Demand Response**	• Peak shaving through demand side management programs
		  ▪ Enhance point load control and TOU programs with real-time verification and measurement
		  ▪ Enable smart home with intelligent appliances
		• Inherent robust and ubiquitous HAN network

	Smart Grid System-wide	• Improving CAIDI, SAIDI, and SAIFI • Customer service and field maintenance labor reduction and improved productivity • Improved revenue assurance and receivables • Conservation Voltage/Var control • Vegetation management • Regulatory compliance • Reduced cost of insurance (outage related)
	Asset Management	• Optimized data collection and system planning • Transformer, capacitor bank and substation equipment automation and management • Asset life extension and failure avoidance • Reduced cost of URD cable replacement
	Advanced Future Grid Enhancements	• Plug-in Electric Hybrid Vehicles (PHEVs) ▪ Demand response, load shedding/shifting capability • Management of distributed generation (including PHEV • Differentiated service offerings

Smart Grid City – Boulder, CO

Collaborating to Build the Next Generation Utility

"The fundamental component for making the smart grid work will be a *robust and dynamic communications network*; providing the utility the ability for *real-time, two-way communications* throughout the grid and enabling interaction with *each component* from fuel source to end use" (Xcel Smart Grid White Paper)

Smart Grid Consortium

- Xcel
- CURRENT Group
- SEL (Schweitzer)
- Accenture
- Ventyx
- GridPoint

Xcel's vision of Smart Grid isn't:

- Only about the electric meter
- Red Light, Green Light
- Layers of stovepiped applications
- Only about energy management
- Only 1 choice for customers
- Picking a winner in advance

Presented to Western Governor's Association, June 2008
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Advanced Sensing

Intelligent Power Quality Monitors throughout Grid

Sensors use built-in intelligence to detect issues and provide complete analysis including wave forms

Voltage Sensing	• Monitors both legs of Secondary (LV) voltage • 16 samples/cycle, 1% accuracy, 10k samples/sec • Exception Reporting • Configurable thresholds for alarming • Intelligent Triggers for capturing and reporting Waveforms
Current Sensing	• Monitors Primary (MV) current • Option to measure Secondary (LV) current • 16 samples/cycle, 2% accuracy, 10k samples/sec • Configurable thresholds for alarming • Five Minute Average Reporting • Intelligent Triggers for capturing and reporting wave-forms • Embedded Fault Detection based on protective device curves

High Performance Communications

Ubiquitous Communications	• High through-put, low latency open architecture communications system

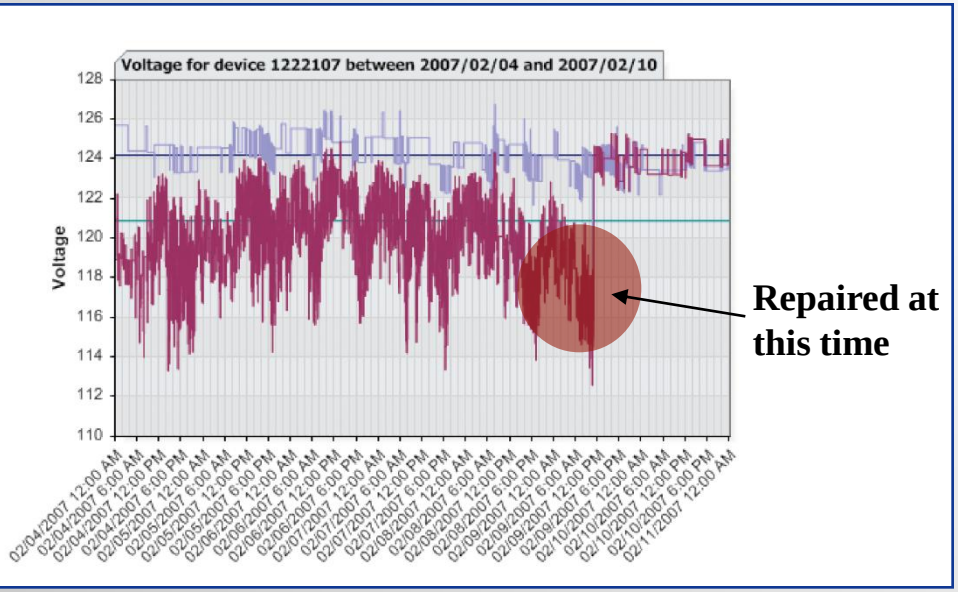
- High speed – low latency
  - System Protection response times
  - Capacity to handle Large Amounts during system events
- Single communications system
  - Serves all utility communications needs, substation through every outlet in the premise
  - IP-based
- Smart Grid requires high speed, low latency
  - Aggregated current and future applications
  - Data comes in waves
  - Upgradeability path is CRITICAL

Actionable Intelligence Case Study

Distribution Asset Monitoring

TRANSIENT SECONDARY FAULT FINDINGS….

- This is a 37.5 KVA, 120/240v transformer with 2/0 copper conductor connecting it to the secondary bus
- One conductor had rubbed against the cooling fin of the transformer and burned the conductor for ~10” back to the secondary bushing of the transformer
- Utility was able to repair before a customer call
- **Result – Outage and potential safety issue avoided**

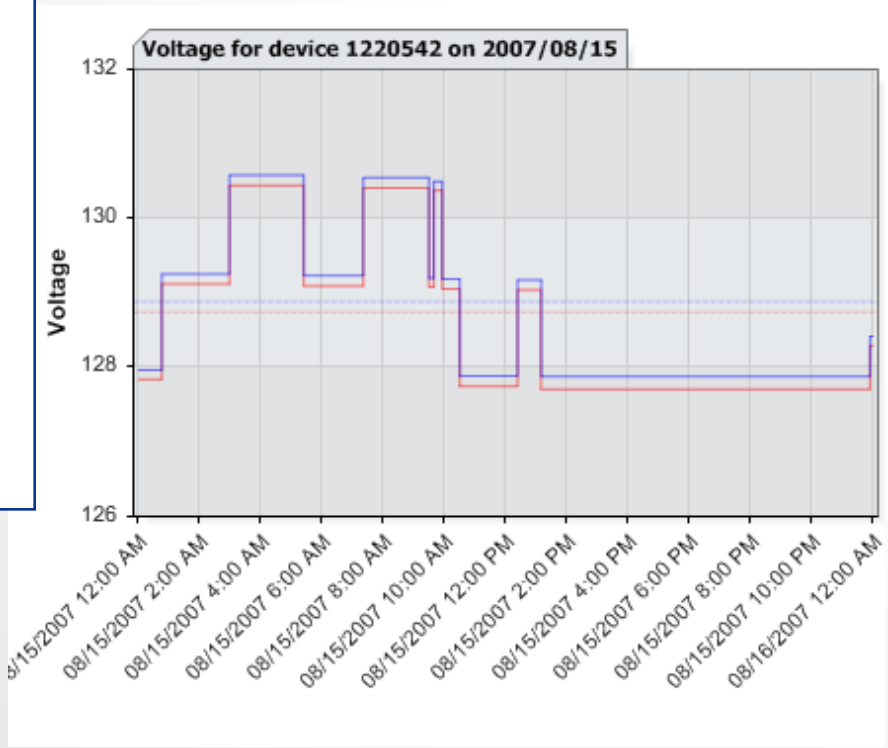


Actionable Intelligence Case Study

System Optimization

Monitor Voltage at each Transformer

- System detects high voltage exceeding thresholds
- Automated notification is sent
- Situation can be analyzed using real time status at various transformers from substation to end of feeder
- Substation Bus voltage can be reduced, optimizing system



Conclusion:

System is better optimized

CURRENT Smart Grid was designed to maximize flexibility and interoperability for the life of the system

Meter and Device Agnostic	• CURRENT Smart Grid is designed independent of specific end-point devices • CURRENT has and can partner with any meter or in-home customer control device manufacturer preferred, present day or in the future • Utility maintains meter/control device vendor choices for the life of the system
Open Standards Network	• IP based network can interconnect with multiple devices and software applications • Connects to any Ethernet enabled device any where on the grid • Leverages BPL, fiber optics and other communications technologies as appropriate • Leverages advances in Internet security/technology
Utility Compatible	• Software systems that fit into Utility's IT infrastructure • Oracle and SQL databases • Open APIs to interface with existing utility software systems • Built-in enterprise level security

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CURRENT Smart Grid™ Summary

Integrated Smart Grid Solution

- Exceeds the guideline requirements of present AMI mandates
- High speed, low latency two-way communications to meet present/future needs
- Embedded advanced sensors provide Actionable intelligence, and software analytics
- Open IP-based standards to reduce costs, simplify integration and ensure future upgradeability
- Real-time, two-way, verifiable and targeted demand response capabilities

Addresses Market Requirements

- Demand-Supply imbalance
  - Greatly reduces operational inefficiencies and line loss
  - Enables peak saving through robust demand response capabilities
  - Enables the monitoring, coordination and control necessary to manage distributed, renewable generation
- Aging Infrastructure and grid reliability
  - Allows the real-time monitoring and proactive maintenance of distribution infrastructure
  - Enables faster and targeted outage detection and restoration
- Environmental impact
  - Functions as a clean, renewable energy source, reducing the need for additional CO_2 emitting generation sources

Accelerating Adoption

- Advanced discussions with Utilities worldwide
- Increasing Political and Regulatory Support as means to solve Demand/Supply issues as well as to reduce Greenhouse Gas
- Future proofed enterprise wide network reduces risk of stranding point AMI solutions
- Improved reliability, efficiency, customer service and asset management