



PUERTO RICO  
**TELECOM**  
CONFERENCE 2011  
**THE NEW FUTURE**

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## Puerto Rico Electric Power Authority's Smart Grid

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# PREPA Smart Grid

## PREPA and PREPA Networks Relation

- PREPA Networks (PREPA.Net) is a wholly owned subsidiary of PREPA Holdings, LLC created to commercially develop PREPA's Optical infrastructure.
- PREPA is Partnering with PREPA Net to create and enable a robust and reliable Smart Grid Communication Network.
- The Smart Grid Communication Network will rely on the Advanced Optical Infrastructure and PREPA Net's WiMax Network.



# Prepa Smart Grid

¿Why the Smart Grid?

## ¿WHY ARE WE SHOWING THE SMART GRID AS AN EMERGING BUSINESS OPPORTUNITY?

- 1 The Smart Grid is a revolutionary concept. It is the biggest transformation opportunity of the electric utility industry.
- 2 PREPA recognizes the need to modernize and optimize its operations and services on a continuous and consistent manner, in tune with technological changes and customer requirements.
- 3 The Smart Grid will incorporate and integrate technology with administrative and operational processes in order to provide greater operational reliability and efficiency of the electrical infrastructure, and support a wide variety of new services and alternatives to customers.



# PREPA Smart Grid

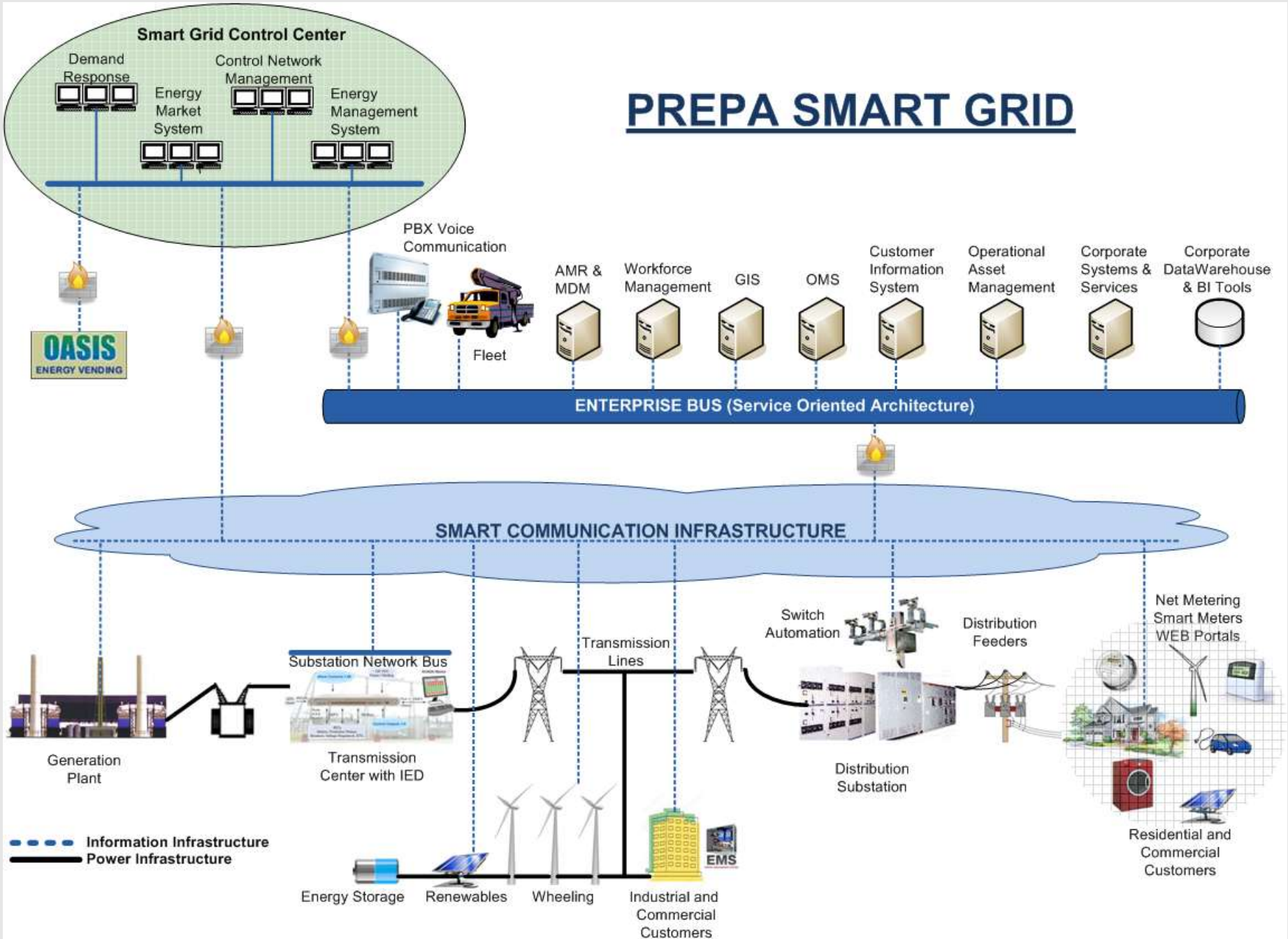
## Benefits

- Improve the electric system reliability
- Improve grid efficiency
- Self-healing capacity
- Grid readiness for renewable energy and electric vehicles
- Provide information to the customer for better energy consumption decisions
- Better outage detection
- Reduce energy theft
- Reduce electricity expenses



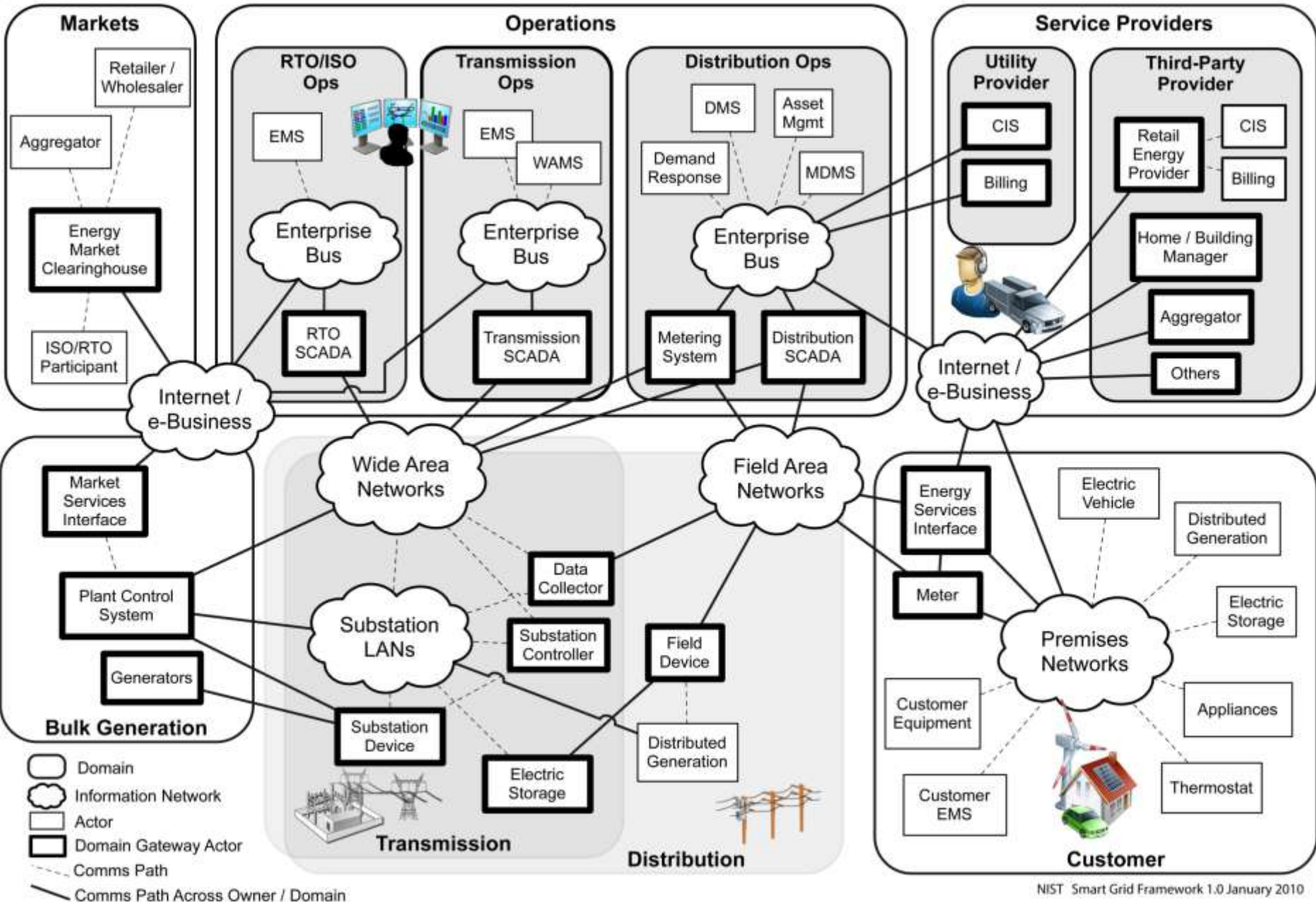


# PREPA SMART GRID



# SMART GRID COMMUNICATIONS MODEL

National Institute of Standards and Technology



# PREPA Smart Grid

## Smart Grid Main Projects



**Operational Systems**



**Smart Meters**



**Distribution Automation**



**Customer Service  
Systems and Technology**





# PREPA Smart Grid

## Smart Grid Communication Technology

- Smart Communication Infrastructure
  - 16 Nodes (1Gb) Fiber Optic Backbone (PREPA – PREPA Networks)
- Operational SCADA System
  - Remote Terminal Units Data Network (100Mb VLAN)
- Distribution Automation
  - Wireless Mesh Networks
- Customer Service System
  - Internal Corporate IP Network
- Smart Meters
  - Industrial Customer: Cellular
  - Residential Customer: TWACS Power Line Carrier (PLC)
  - Bucaré Pilot Project: Broadband over Power Line (BPL)
  - Aguirre Town: WiMAX

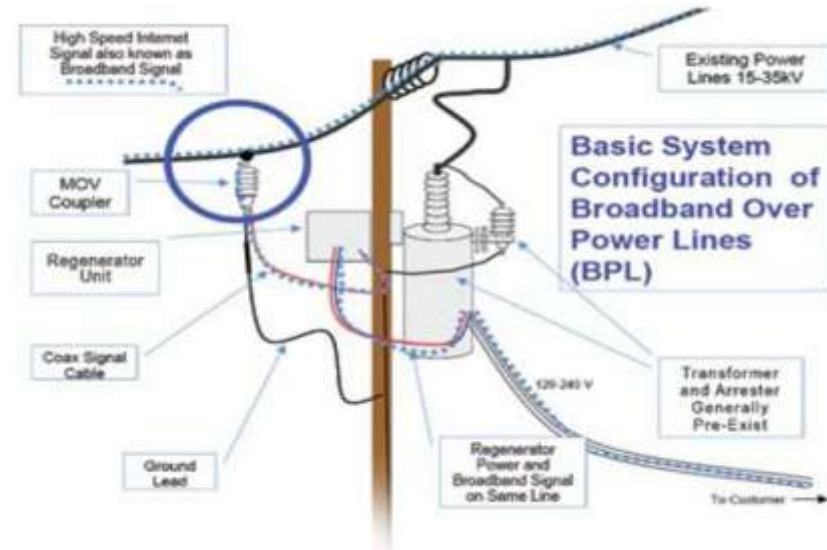




# PREPA Smart Grid

## Bucare Pilot Project

- Broadband over Power Lines
- Speed: 720kbps to 1.5Mbps
- Echelon Smart Meters
- Water Meters
- Video Camera
- Home Energy Consumption Dashboard



# PREPA Smart Grid

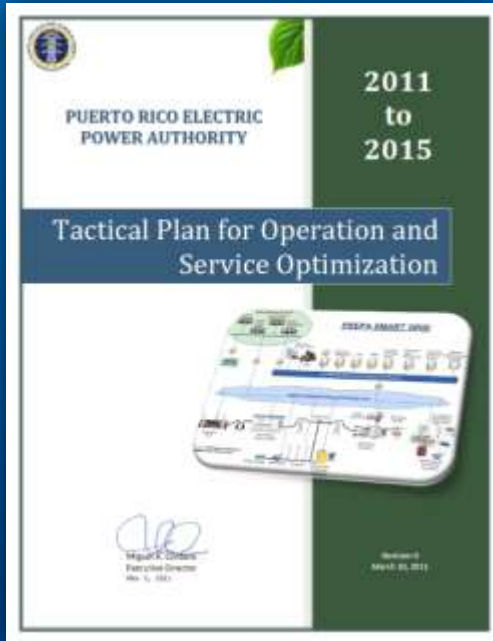
## Standards and Protocols in Evaluation

- **DNP3** – Substation and feeder device automation as well as communication between control centers and substations
- **IEC 61850** - Communication within transmission and distribution substations for automation and protection. It is being extended to cover communications beyond the substation to integration of distributed resources and between substations.
- **IEEE P1901** - Broadband communications over power line medium access control (MAC) and physical layer (PHY) protocols
- **ANSI C12** - Smart meters deployment
- **IEEE 802** – Wired and wireless LLC/MAC/PHY protocols



More Information in:

[http://www.aeepr.com/smart\\_grid.asp](http://www.aeepr.com/smart_grid.asp)



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**THANK YOU!**

