Transmission & Distribution and Bulk Power

T&D and Bulk Power Issues

- Distribution system design changes for pervasive …
  - ✓ Demand response (DR)
  - ✓ Distributed, renewable, intermittent supply
  - ✓ Plug-in electric vehicles (PEVs)
- Impacts of ✓ above on transmission congestion & capacity costs
- How distribution companies will detect & mitigate PEV installation clusters
- Smart grid control method effects on penetration of renewable variable generation
- Value of improving distribution system quality & reliability
- Data needed to support above technologies & design changes
- Revenue consequences of improved distribution & customer efficiency

Advanced Metering

Metering Issues

- Meter functions needed to achieve the goals
- Scale of initial deployment
  - ✓ Targeted – dispersed – saturation
- Consequences of requiring customer communication inside the meter
- Meter feature set impact on …
  - ✓ System functionality
  - ✓ Overall business case
- Ownership, security & privacy of customer data
  - ✓ Meter data
  - ✓ Other data from inside the customer site
  - ✓ Who is “keeper” of the data?
    - Regional MDMS?

Meter Functions Needed to Achieve Goals

- **Goals**
  - ✓ **Customer choice & response (DR)**
  - ✓ **Improved reliability & security**
  - ✓ **Renewable sources**
- **Meter functions**
  - ✓ **The “Texas 11”**
  - ✓ **Data frequency**
  - ✓ **Data transport capacity (“broadband” or not)**

The “Texas 11” Meter Functions

- Automated meter reading
- 2-way communication
- Service switch
- Meter data time-stamped
- Customer direct real-time access to meter data
- Means for utility to send price signals customer
- 15-minute data delivered daily
- Data stored in meter in compliance with IEEE C12.19
- Communication with utility by open protocol “such as” IEEE C12.22
- ZigBee communication with customer devices
- “..ability to upgrade these minimum capabilities as technology advances”

Customer Communication in Meter

- Risk of protocol obsolescence
- Benefits of immediate utility rate/program implementation
- Uncertain emergence of new business services to support goals
- Exclusive utility control of communication path to customer
  - ✓ Potential future business models for communication to customer & appliances

Meter Feature Set Impacts

- More capable meters …
  - ✓ Raise cost
  - ✓ Expand benefits
  - ✓ Increase security requirements
  - ✓ Enable diverse future functions
    - Mitigate future risks
- Business case impacts
  - ✓ Benefits become more numerous & more uncertain
  - ✓ Technical foundation supports a wider array of possible business futures