



CommNexus Clean Energy SIG Smart Grid

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What is the Smart Grid?

- Power generation systems
- Transmission / distribution systems
- Monitoring systems
- Renewable energy
- Self healing power network
- Cool new meters in the home

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- Cure world hunger
- Bring peace to the Middle East

My Focus Today

- Debra Reed, president of SDG&E recently said:
 - The capacity provided by the last two power plants built by SDG&E is required for only 100 hours per year
- In addition to a lot of things, the Smart Grid will increase the ability of the utility company to “manage the load”

Old (dumb) Meters

- Meters used to track total usage, with readings taken once per month
- In the oldest systems, a worker walks the streets, taking the reading from each house manually
- About 15 years ago, they came up with short distance radios, the reading could be taken by “drive by” receivers

Smart Meters

- Now, two way radios are part of meter
- Usage readings taken every 10 – 15 minutes
- Readings cached in meters, periodically sent to utility over radio – data can be sent hourly (and utility can request an instant update)
- Utility can send commands to meter

How to Manage the Load

- Changing consumer behavior
 - Time of day billing
 - Instantaneous feedback to consumers on usage
- Utility can manage load directly
 - During times of peak load, the utilities can send commands to control devices within the home (with prior agreement with consumer)

Communications Technology

- Low power radio communication, using mesh network technology
- High power radio communication
- Cellular network connectivity

Control of Home

- Messages from utility to home typically come to meter and then are retransmitted within the home using some wireless technology
 - ZigBee (802.15)
 - Z-Wave
- These messages are used to control thermostats, enable / disable appliances, etc

Challenges to the Utility

- The utility must replace all existing meters with the Smart Meters
- The utility must now manage this network of endpoints, the RF network
- Network must be secure
- The utility must capture A LOT more data (10 minute readings instead of monthly readings)

Challenges to the Utility

- The utility must integrate this new data into the existing back office infrastructure
- The utility must modify customer service capabilities to send commands to meters
- Integration of the Smart Meter vendor's hardware and software into the existing infrastructure is a major part of the effort required to get these systems moving

Other Smart Meter apps

- BC Power: Justified and used their Smart Meter deployment to pursue “theft of service”
- Expand RF networks to include water and gas meters
 - While the same “manage load” justifications do not exist, the justification for reducing cost of meter reads is still huge
 - Typically can use the same RF network
 - Challenge is battery life – these meters are typically not wired for power

Future

- US Market is in the middle of deployment – contracts will be awarded in next few years – installations complete within 5 years
- European market is just gearing up with a few pilot programs
 - Typically government run monopolies
 - Will make decisions for country wide installations