APEC

SmartMeters – Beyond Billing

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Smart Meter - Beyond Billing

- Billing
- Service Connect/Disconnect switch
- Home Energy Displays
- Demand Response with Pool Pumps / PCTs / Smart Appliances, etc.
- Service Phase identification
- Historic Data
- Transformer Load Monitoring
- SCADA Voltage (eDNA)
- Transformer Failure Detection
- Asset Management Transformer Loss of Life Calc.
- Historic Data
- Proactive Storm Analysis Demonstration
- Real Time Data
- Outage Restoration
- Outage Notifications
- Hi Impedance fault Detection
- Real Time/Historic Data
- Rule 2 compliance
- Power quality
- Low/High voltage
- Conservation Voltage Reduction CVR
- Optimize Capacitor Bank placement
- Historic Data
- Real Time Data
- Historical Data
- Aggregate Customer Loads (Watt)
- Waveform signature
- Voltage
- GIS/SCE's Electrical Network
- SCADA Voltage (eDNA)
- Outage Restoration
- PDN/PM Exceptions
- Meter Events
Home Area Network: What We Thought Would Happen
Home Area Network: What We Thought Would Happen

- Retail Market for ZigBee Smart Energy Profile (SEP) HAN devices
- Customers purchase Home Area Network (HAN) devices that can be leveraged by utility programs
- Meter connection required for access to energy information and to signal Demand Response Events
- SEP 2.0 would improve functionality, security, etc.
- Smart meters would be upgraded to SEP 2.0
- Customers would purchase devices that showed energy consumption information
Home Area Network: What Actually Happened
Home Area Network: What Actually Happened

- HAN retail market did not develop as anticipated
- A retail market of Internet connected thermostats and home automation systems developed
- Although a connection to the meter is required for energy information, there are alternatives such as the Internet for signalling DR events
- SEP 2.0 took longer than anticipated to be finalized and has yet to gain traction in the consumer market
- SCE smart meters will not be upgraded to SEP 2.0
- Energy only devices don’t seem to be compelling to customers, but energy may be a potential add-on
Voltage Management

View of system voltage fluctuations and assets outside of voltage limits
Secondary Voltage Profiles

• View voltage profile along distribution circuit

Voltage drop vs. circuit distance from substation

Hourly secondary voltage bounds on circuit (min/avg/max)
Transformer Loading

Evaluate peak load, loss of life and load allocations
Transformer Overloads

• View area wide heat map of asset loading and at-risk transformers
Load Aggregation

- Load profiles by circuit or at any system node (recloser)

Load profile downstream of selected recloser
SAIDI/SAIFI Feasibility Study

From Wikipedia, the free encyclopedia:

The **System Average Interruption Duration Index (SAIDI)** is commonly used as a reliability indicator by electric power utilities.

SAIDI is the average outage duration for each customer served and is calculated as:

\[
\text{SAIDI} = \frac{\text{sum of all customer interruption durations}}{\text{total number of customers served}}
\]
Meter to Transformer connectivity

- Using Smart Meter Outage Events
- Using Voltage Signatures
Meter to Transformer connectivity

• Using Voltage Signatures
  – Based upon 1 hour average voltage readings
  – Uses the Kendall’s Tau correlation

$$\tau = \frac{(\text{number of concordant pairs}) - (\text{number of discordant pairs})}{\frac{1}{2} n(n - 1)}.$$

– Applies a radial distance limit to filter outliers
Transformer Monitoring (using Smart Meter technology)