Best practices for smart meter data management

Gary Michor
President and CEO
The SPi Group Inc.
Agenda

- Metering today
- Metering tomorrow
- Transition to smart meters
- Issues to think about
- Solution – open standards
- Case study – OUSM pilot
Metering today

- Specialized expensive time-of-use (TOU) metering systems for large-scale commercial/industrial customers only
- 6 to 12 data points per year for the average customer account
- Translates to 52,000,000 read values across all LDCs annually – if read every month
- Period-based manual meter reads
- Monthly or bi-monthly customer invoice providing minimal consumer information
Metering tomorrow

- Wide-scale deployment of smart meters for all customer accounts
- 8,760 data points per year for all customer accounts (minimum of 700 times more data)
- Translates to a minimum of 38,000,000,000 read values across all LDCs annually (~ 1.6 TB of data)
- Fully automated meter reading systems capable of on-demand functionality
- Daily customer uploads of hourly or summarized consumption information
Transition to smart meters

- What is the capability of the IT infrastructure currently in place?
- How do current staff job functions relate to the required processes for handling smart meter data?
- What new systems or applications are required? What changes to existing applications are required?
- What new processes need to be developed?
Issue: Data collection

- AMI collects hourly interval values one or more times a day
- By the next morning, all 24 interval values have been provided to the Meter Data Management/Repository (MDM/R)
- Parties must face many types of data feeds
- LDC selects MDM/R based on requirements
Issue: Validation, editing and estimation

- All VEE processing is completed by the Meter Data Management/Repository
- MDM/R may complete the processes internally or externally through a third party
- Information is re-versioned after each stage
- LDC selects MDM/R based on requirements
**Issue:**

Data storage and retrieval

- MDM/R stores all meter reads
- CIS/billing systems request information from MDM/R
- MDM/R aggregates (when required) interval values into TOU rate structured buckets
- LDC selects MDM/R based on their requirements
Issue: Process & application interface

Advanced Metering Infrastructure
Energy Retailer1
Energy Retailer2
Consumer Presentment/AVR
MDM/R
LDC
Billing & Settlement
Wholesale Metering Systems
Government Reporting
IESO
Consumer Directory
Issue:
Systems & process change requirements

- Customer information system (CIS)
- Bill processing
- Settlement systems
- Retail market transaction processing
- Metering technologies and meter reading systems
- Other supporting systems and applications
MDM/R provides daily interval or aggregated consumption values for either Web presentment or AVR system retrieval.

- MDM/R provides monthly aggregated consumption values to CIS/billing systems for monthly consumer invoicing.

- LDC selects MDM/R based on their requirements.
Issue: Industry reporting

- As required, MDM/R aggregates the interval values into the desired reporting structure
- MDM/R may utilize an external third-party service provider to complete more sophisticated aggregation required across the province
**Issue:**
Resource constraints and knowledge gaps

- Already operating with lean IT/IS teams
- Other initiatives already underway
- Not all staff familiar with the technologies
- Knowledge transfer cannot begin until after Government finalizes structure
- Timelines are extremely tight
Solution:
Open standards

- Development of a smart meter data network based on the established model and standards currently in use for the retail electricity market’s EBT network
- Inclusion of a provincial consumer directory integrated into the smart meter network
- Development of open data standards for providing information between the different market participants
Smart Meter Network

Energy Retailer

Retail Network

LDC

CIS (Billing & Settlement)

IESO

Government Reporting

Web Presentment/AVR

Advanced Metering Infrastructure

Wholesale Metering Systems

Data Aggregator

Consumer Directory

Network

Meter Data Management / Repository
Open data standards

Standards mitigate risk by:

- Providing clear testing and certification guidelines for vendor integration
- Enabling participant choice to select tools and services
- Simplifying system enhancement, replacement, upgrades or insertion
Open data standards

Standards provide relief from aggressive timelines by:

- Establishing a clear set of testing and certification guidelines, which reduces implementation timelines
- Reducing integration efforts between smart meter components
- Aligning participants to achieve a common implementation strategy
Open data standards

Standards help lower costs by:

- Fostering a competitive market where solution vendors can offer alternative systems and services
- Reducing effort to switch from one vendor or service provider to another
- Reducing implementation, testing and certification phases
Consumer directory

- Combined with the Smart Meter Network, the consumer directory adds intelligence and functionality creating a smart hub.
- Used to track consumer relationship with all other market participants (i.e. LDCs, retailers, third-party service providers, meters).
- Allows a consumer to maintain access to all of their meter data, regardless of where they go in the province.
Case study: OUSM Pilot

- Ontario Utility Smart Meter (OUSM) Working Group, an affiliation of LDCs (30+), tested with and evaluated the operational functionality of 5 AMI vendors and 6 MDM/R vendors
- Utilized a test smart meter network (hub) in which all participants are connected to the hub using individually-generated spoke connectors
- Provided an interim report to the Ministry in mid-December 2005 documenting their initial evaluation results
Case study: OUSM process testing
Case study:
OUSM progress to date

- Stage 1 - Pilot Smart Meter Data Network (SMN) implemented to facilitate smart meter data flows
- Secure Web site established to distribute software updates, track issues online, etc.
- Stage 2 - required all documents to be converted to the standard developed by the Smart Meter Data Working Group
  - Standardized spokes to connect to the pilot SMN
Case study: Operational issues and actions

**Issue:** Uniquely structured data outputs for each AMI vendor

**Action:** Implemented a process to convert AMI outputs to a standardized XML data transport schema established by the Smart Meter Data Standards Working Group.

**Issue:** MDR vendors only able to process specific AMI vendor data outputs

**Action:** Implemented a process to convert from the standardized XML data transport schema to any requested AMI (OUSM network participating) vendor specific data output format.

Highlights the requirement to develop and implement specific open data standards to be used by all participants.
Case study: Results

- Gaps identified between AMI vendor schemas and the standard schema
- Gaps identified in technologies (hardware and software) used
- Gaps identified in communication between all parties
- The parties are able to communicate in a standardized format without depending on each other (much like the CIS systems in the retail electricity market)