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Meter Based Technical Data Collection

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Summary

• ENERGEX
• Energex Metering
• Multifunction Meters
• Systems Architecture
• SmartGrid Initiatives
• Information Management
• System Standards
• Closing remarks
• Questions.
ENERGEX Ltd
• Distribution Electricity Utility based in Brisbane, Southeast Queensland, Australia.
  • 1.5 million customers
  • 2.2 million meters
Energex Metering

- Systems and infrastructure strategy, development and support for both manual and remote read meters
  - Regulated revenue metering in Energex – manual register read
  - SmartGrid Projects with metering technical data - load and PQ remote reading and system management
  - Unregulated National Electricity Market Type 1-4 - remotely read nationally

- SmartGrid initiatives supported:
  - Expand technical data collection into the LV network
  - Assess new technologies in data collection
  - Reduce Peak Demand Growth
    - Improve load control
  - Collect and provide technical data
  - Analytic tools to improve performance
Multifunction Meters for Network

- Meters were revenue based - load data and status flags
  - Manual read or remote (Itron MVRS / MV90/IEE)
- Using meter functionality to support concurrently revenue and technical monitoring roles
- Meter configuration.
  - Load Survey 1 – Revenue: (15 or 30 min load profile)
  - Load Survey 2 – Technical: Phase based V, I, p.f. (1 min & 10 min profile)
  - Exception reporting of events
- IP Communications method chosen to suit function latency
Multifunction Meters

Multifunction meters measure:

- voltage & current
- phase angles
- outages, sags & swells
- harmonics and waveforms
- multi channel profiling
- energy – import/export

Providing Network Information:

- Peak Demand Reduction
- Power Quality Management – voltage, PF, harmonics (PQ Class B functionality)
- Phase balancing
- Planning
- Network efficiency & improvement
- Asset Utilisation
- Embedded Generation
Multifunction Metering & Network Performance

Metering as network monitors

- Class 1 accuracy suitable for Tx monitors
  - Cost effective with modem power supply
- Technical data measurement
  - (instantaneous & interval)
- IP communications – All sites IP over GPRS

Technical data collection

- Meter Management Systems (MMS)
  - Data collection, alarms, events and asset management
- Metering Headend - In house system design & build
  - Stage 2 - migrate to CIM standard subject to industry trend
  - Handover point of truth from metering to network data domain.
SYSTEM ARCHITECTURE

Knowledge Applications – DMS and DMA Analytic Apps

Network Data Warehouse via Operational Data Bus

Revenue Data Collection Warehousing & Settlements (MDM)

Metering Head End Technical Data Collection, Control, Data Store – Meter Mgt System

Network Devices Head End SCADA

Manually Read

Remote reading of revenue & technical data

Intelligent Multifunction Meters

Intelligent Network Devices

HAN / IHDs

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SmartGrid Architecture Example

Distribution Mgmt System
- Outage Mgmt
- Demand Response
- Virtual Power Plant
- FDIR - IVC

Energy Information Mgmt
- SCADA
- Load Flow
- Switching

GIS Asset Mgmt / Analytics
- DMS History
- Waveforms
- Harmonics
- Analogues
- Alarms

Core Network Model
- Ratings Engine
- Connectivity
- Spatial Ref
- Versions / History

Configuration Models
- Power Model

Real Time Message Integration Bus – CIM Model – Complex Event Processor

Gateway Zones
- Scada Concentrators
- Dist Transformer Gateway
- Communications Management
- Video Streaming

Policy Management
- Configuration Management
- Meter Head End

Service Bus Gateway

Enterprise Corporate Message Bus
- Engineering Analysis
- Engineering Modelling
- Planning Design
- Forecasting

Customer Analytics
- Business Intelligence
- Call Centre
- Field Force Mgmt

Customer Internet Portal
- CIS Billing
- ERP
- MDP
- Remote Observation

3rd Party
- Load Retailer Aggregator

3rd Party
- Demand Meters
- DER

ENERGEX Fibre Network

IP – DNP3 - IEC 61850 - IEEE C37.118 - Comtrade
- IEC 61850 - DNP3 - Comtrade
- IEC 61850 - DNP3

IP – DNP3 - IEC 61850
- GOSEM/DLMS
- ANSI C12.19

Zigbee Smart Energy Profile - Internet

Home LAN
- Customer Portal
- Demand Side Mgmt
- Distributed Energy Resources

Mobile Workforce

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SmartGrid Initiates

- Rollout of Transformer Monitoring - Meters
  - New transformers >100kVA
  - Retrofit program replacing Maximum Demand Indicators
  - PQ Class B Monitoring to all Zone Substations
  - 5000 Tx monitors (Class 1 meters) new and retrofit in 2012/2013
- Trial Power Line Carrier (PLC) data collection and control
  - Prime Meters – Focus on communications performance
  - LV underground and overhead
- Airconditioning compressors cycling reduce peak demand
  - Audio frequency (decabit) based controllers to manage cycling.
SmartGrid Trials

- **Trial Static Var Compensator (Statcom) technology to**
  - Improve power quality on LV networks
    - Customer PV voltage rise during low demand
  - Determine implementation of Distributed Energy Resources (DER)

- **Trial network & customer battery storage with SVC**
  - Manage peak demand - LV feeder and customer
  - Improve voltage regulation through VAR management
  - Develop new LV topologies and configuration for DER
  - Determine economics of network battery storage
  - Simulate the effect of EV charging on LV networks
At evening peak
No compensation

With 30kW PV generation & minimum loads.

1x20kvar compensation
Key Issues - Information Management

- Increased end to end systems complexity
- Multidiscipline team (power engineering, communications, IT)
- System integration challenges
  - Developing the tactical strategy and operationalizing within the organisation
    - Meter Management Systems (MMS)
    - Communications Infrastructure and data routing
    - Interfacing to Corporate applications, work & asset management & CIS
    - How is the data mastered and referenced in systems – source of truth?
    - Is the data accurate and reliable?
    - How does ICT support OT Management and Governance?
- Metering asset management
  - Increased testing and validation of meter data, configuration and firmware and communications
  - Relationship association of equipment on site.
System Standards

Information delivery from meter to network systems presents challenges

- Multiple device systems with various export formats?
- Standards for data interchange - Meter to network analytic systems?
  - Should IEC61850 / DNP3 expansion into metering?
  - Will Common Information Model Standard resolve data interchange challenges?

Application of meter data collection standards

- ANSI C12.19 & 22 vs COSEM/DLMS vs Proprietary for technical data?
- Multiple vendors and devices support effectiveness?
- Common data storage structure with standardised data views?
- Simplified integration into corporate and analytic applications?

Regulators defining localised Smart Metering functionality

- Fragmented markets impedes volume to price benefits
CLOSING REMARKS

Regulators setting new benchmarks for Networks
• Quality of supply & reliability focus to demand mgt & reduced expenditure

Network Performance requires:
• LV technical data for decision analysis to improve performance & costs
• Intelligent Electronic Devices (meters) providing the technical data

Success requires:
• An integrated solution key to providing accurate, timely & reliable data.
  • Strategy for data type, configuration, system integration & use cross business
  • Proactive process ownership, governance & management of increased data volumes and type from LV system
• Multidiscipline expert technical team managing end to end solution
• Support for standards to simplify data transfer between systems
• Vendor support for change.
QUESTIONS ?

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