Smart Metering Initiative
ADWEA Program

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Dec 2010
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Background

• In 1998 the Water & Electricity Department Privatized & ADWEA Was established
• The sector Evolved into distinct **Generation, Transmission, Distribution**, and into 9 separate companies
• Independent Regulation & Supervision Bureau (RSB)
• There are two distribution companies AADC & ADDC
The companies set goals to:

- Offer future proof solution for energy
- Improved Customer service, CRM & Billing and
- Comprehensive Energy data management
- Paving the way towards a SMART network

- CRM / Billing project was completed in 2005
- AMI project was established in Aug 2006
**SMART GRID – BASICS**

**Drivers and Comparisons – An Outlook**

**Conventional Networks**
- Unsustainable Energy System.
- Generation Follows Load.
- Fossil Energy Sources.
- Centralized Power Generation.
- Outages and restoration are fault driven

**Smart Grid Networks**
- Sustainable Energy System.
- Load Follows Generation.
- Integration of Renewable Energy Sources
- Decentralized Power Generation.
- Outage Prevention & Restoration
SMART GRID - BASICS

Energy Saving

- Power (MW)
- Time (Hrs)
- Peak Demand
- Shaved Demand

(Simulated graph showing energy saving and peak demand across different hours.)
ADWEA - AMI Project Strategy

• Towards High performance Business
• Corporate Strategy alignment
• Incorporate Innovation process
• Change & Program Management
• Master schedule - Strategic goals
Project Scope

• **Objective:** Implement a fully automatic meter reading and meter intelligence monitoring and data capturing system to encompass the entire consumers of water & electricity in the Emirate of Abu Dhabi

• **Key Performance Indicators (KPI):** Reliable and timely meter reading, instant meter read & two way data sharing between meters and CRM/Billing systems

• **Benefits for ADWEA:** Improved consumer bill accuracy, faster revenue collection, ability to push consumption data to consumer, accurately aggregate consumption within Distribution network. Pave the way for a SMARTER NETWORK.
VISION

Core Utility Network
- Utility Core Systems
- Corp Office
- Power Plant

Distribution Area Network
- Substation
- Transmission System
- Distribution System

Meter Aggregation Network
- Meter Aggregation

Home Appliance Network
- Home Appliance

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DESIGN

• Water & Electric meter data collected by “End Point Units”
• A multi point system collects data via Power Line Carrier (PLC) at the base of high rise buildings
• Data is then transmitted via Meshed wireless & Fiber Optic network to the servers
• Locations where the meters are far apart, RF technology is utilized instead of PLC
Topology

Meshed Wireless Network

- Ethernet over Power Line/MBUS
- High-Rise Collector
- Wi-Fi CPE
- Wireless Collector
- Wireless Electricity Meters

Utility Operations

- Meter Management System
- Network
Implementation

• Four Phase Approach
  1. Collection & Initial Validation of meter data
  2. Verify & Analyze data for the purpose of billing
  3. Integrate into the CRM & Billing system (bi-directional process)
  4. Integration into the entire ADWEA SMART network
Wi-Fi Network

Head-End Systems

AMPEP
AMR Application

AAS-WEB
Amplight Appl.

LV
LV Application

MDMS
Meter Data Exchange

• Validation
• Estimation
• Analysis of Meters Data
• Consumption Calculation
• Trends & demands
• Forecasting

CC&B
Billing Data Exchange/info

• Premise ID
• Customers ID
• Customer Profile
• Accounts ID
• Billing
• Tariff Schemes

GIS

Data Bus

ERP

Meters Data

Controls

Phase I

Phase II

Phase III
Implementation

• Design
  – Flexible solution that satisfy company needs and regulatory demands
  – To cater for immediate and future requirements
  – Proven, current and fail safe technology
  – Implementation with minimum interruption to customers
Leveraging ADWEA Assets

Shoebox-sized radios unobtrusively mounted on sub-stations and street light poles

Connected through ADWEA sub-station fiber infrastructure
AMR Metering Points: A Close-up
SUPPLY AND INSTALLATION OF THE AUTOMATED METER READING (AMR) TECHNOLOGY SYSTEM
Contract No. G-3923 - (Original & VO1)
OVERALL PROGRESS S-CURVE
REV (0)
OVERALL 'S' - CURVE FOR ORIGINAL & VARIATION1
Challenges

- Technical issues
- Challenges: Communication (TRA) & Asset Installation
- Risks: (Reliability & Interoperability)
- Villas, buildings, farms
- Multiple meter manufacturers
Next Step

• Building blocks towards the SMART GRID
• Mobile workforce management
• LV AMR enabling
• Distribution NMS
• Alternative Generation
• In Home monitoring devices
ADWEA Mesh Fibre Backhaul

- High Voltage Sub-Station
  - 10GE Ring
  - 10GE
  - 1GE
  - 100FX

- Low Voltage Sub-Station
  - Street Light
  - 10GE
  - 100FX

- ISP POP
  - DHCP
  - DIR
  - IDSS
  - RADIUS
  - DNS
  - Etc.

- TROPOS Control
- AMR NOC
- DHCP

Abu Dhabi Water and Electricity Authority (ADWEA)

- NOC
- Control
- Network Operations Center
- DHCP
- TROPOS
- AMR NOC
- ISP POP
- Street Light