Securing Smart Grid Implementation:
Case study using IBM WebSphere® DataPower® Appliance

David B White (dwhite@miraclesoft.com)
Business Development Manager
Miracle Software Systems, Inc
Session ID – 3235A

Tuesday 3:15 – 4:30 - Venetian Marco Polo 703
Agenda:

- Energy/Utility industries direction
- Smart Grid overview
- Information security and integration challenges in the Smart Grid solution
- IBM WebSphere DataPower’s role in Smart Grid Solution
- WebSphere DataPower SOA appliance product line
- IBM WebSphere DataPower’s usage patterns
- DataPower appliances use case in Utility/Energy sector
- Examples of client value achieved by Miracle
Industry Standards to make integration with utility business systems easier

- Many disparate systems speaking different protocols
- Legacy systems and mergers increase complexity
  - Do not want to replace systems
  - Must provide flexibility to work with other systems
- Both Industry Standards, EAI and BPI are necessary to integrate systems
  - Enterprise Application Integration (EAI) allows connections at application and data level
  - Business Process Integration (BPI) enables business logic to support processes
  - EAI and BPI together enable Business Performance Management (BPM)
  - Industry specific standards enable EAI, BPI, and BPM to be leveraged for niche critical applications extending integration throughout the enterprise.
- Standards and middleware improve integration efforts
  - Common data and service standards help systems talk the same language
  - Enterprise middleware provides a logical separation between business logic and data integration
Energy/Utility Industries Direction

Converging market forces are driving utilities to seek new approaches and business models ... driving investment and innovation

These forces are increasing the need for greater network reliability, efficiency, flexibility and “observability” ... creating the necessity for the Intelligent Utility Network
Utilities Must Manage 2 Infrastructures

1. Power Infrastructure

2. Data Infrastructure
International Electrotechnical Commission (IEC) Standards

- Technical Committee 57 (TC57) is responsible for the development of a set of model-driven standards for the operations side of energy utilities:
  - **Communications Protocols:**
    - IEC60870-6 *Telecontrol Application Service Elements #2 (TASE.2)*
      - Time critical data exchange between utility control centers for ensuring transmission system reliability
      - Control center to power plant for economic dispatch
    - IEC61850 *for substation automation*
      - Object oriented protocol for intelligent electronic devices
  - **Integration:**
    - IEC61970 *Common Information Model (CIM) for power systems*
    - IEC61970 *Generic Interface Definition (GID) integration APIs and services*
    - IEC61968 *CIM and XML messaging for distribution automation*
Provide a common agreement on **What data is exchanged**

- The Common Information Model (CIM)

Provide a common agreement on **Services to exchange the data**

- The Generic Interface Definition (GID)

**The benefits of using CIM and GID:**

- Access to the vendors, applications, sensors, and the general plant environment that can be connected to the IBM Services Oriented Architecture (SOA) via off-the-shelf adapters.

- A service oriented adapter can be fed with data from hundreds of devices and applications with little or no investment or development.

- Object model abstractions organize the data and give structure to the service actions that are invoked from business applications to provide the consistent integration method needed to build off-the-shelf adapters.

- Adaptor approach follows industry standards.
$11B Smart Grid -
Transform nation’s energy transmission, distribution and production systems by allowing smarter and better grid
Includes funding for R&D, pilot projects, and federal matching funds for the Smart Grid Investment Program

$16.8B Renewable Energy R&D -
Investing in renewable technology to transform nations energy to use “clean, efficient American energy”
Includes funding for R&D, demonstration, and deployment activities
Funds awarded competitively to universities, companies, and national laboratory

$5.4B Fed Building Efficiency -
Funding for renovations to federal buildings including at least $6B focused on increasing energy efficiency
Projects are selected based on GSA’s ready-to-go priority list
What Technologies Qualify for Smart Grid Stimulus Funding?

The term "smart grid" describes a range of technological and infrastructure solutions related to the dynamic transfer of electricity from the electric grid to retail customers, and vice versa.

Reference to Title XIII of the Energy Independence and Security Act of 2007

Email dwhite@miraclesoft.com for a copy

Smart Grid program being funded by the American Recovery and Reinvestment Act (Stimulus Package) includes:

- Increased use of information and control technology for management and dynamic optimization of the transmission and distribution infrastructure

What Technologies Qualify for Smart Grid Stimulus Funding

- Deployment and integration of distributed generation, including renewable energy
- Development and incorporation of demand response, demand-side resources and energy-efficiency resources;
- Deployment and integration of smart technologies for metering and monitoring energy use, and of smart appliances;
- Deployment of advanced electricity storage and peak-shaving technologies, including plug-in electric vehicles and thermal-storage air conditioning; and
- Development of standards for grid communication and interoperability.
Stimulus Package Objective – Smart Grid Increased Employment Estimates

• Installers needed – AMI and Smart Sensors - $6 Billion, 10,000 jobs
These jobs include team and project managers, site inspectors, work depot teams (the trucks to transport the Smart Meters must be loaded and unloaded each day), trainers, schedulers, bookkeepers, etc.

• Transmission & Distribution Electronic Projects - $1 Billion, ? Jobs
It is unlikely that enough installers could be trained for widespread replacement of distribution or transmission plant electronics and have a significant impact on nationwide employment. Replacing devices such as transformers, capacitors banks, etc., require a highly trained staff.

• Software Engineering – $2 Billion, 10,000 Programmers
If $2 Billion is allocated for software systems, and if $500 Million is the purchase cost of the software, then the rest of the money would be for software integration. If the fully loaded cost of a software engineer is $150K per year, then another 10K junior programmers could be hired at $60K per year.
Energy/Utility Industries Direction

Stimulus Plan Objective - Call to Action

• Finish your Smart Grid business plans
• Pick a vendor (unfortunately there is limited time to do pilots; so they should visit other utilities that have already deployed the technologies and base their selection on others’ experiences)
• Pick an installation company (unfortunately there is limited time to install it yourself; a slow installation means that funding opportunities will be lost)
• Develop implementation plans before the projects are funded
• Provide incentives to reward vendors and installers that meet or exceed challenging deployment schedules
• Identify funding sources for their matching monies.
Energy/Utility Industries Direction

- **Energy Independence and Security Act of 2007 identifies Smart Grid as the future direction for electricity grids in the United States of America**

- **Smart Grid – Modernization of the electricity grid to improve reliability and efficiency**

- **Advantages of Smart Grid implementation**
  - Adding more clean and green power sources in our fuel mix—greatly improving power delivery and reliability while optimizing environmental benefits.
  - A grid that allows more choice about when, how much and what kind of energy consumers use.
  - A digitally enhanced, more resilient and stable energy grid that is less prone to outages and improves power reliability.
  - More energy efficiency and conservation options to manage consumers energy dollars.
Smart Grid Overview

- A dynamic system rich in information technology
- High-speed, real-time, two-way communications
- Sensors throughout the grid enabling rapid diagnoses and corrections
- Decision-making data and support enabling peak efficiency
- Distributed generation technologies (such as wind turbines, solar panels and plug-in hybrid electric vehicles)
- Automated “Smart Substations”
- In-home energy control devices
- Automated home energy use
Information security and integration challenges in Smart Grid Solution

- **Security Challenges**
  - Network security of distributed systems across meters, substations, poles and In-home devices including authentication, detection, and monitoring
  - Identity & access management for managing customer information
  - Messaging and application security communications including data, network communications, and transactions
  - Security policy management and implementing web services security standards

- **Integration Challenges**
  - Adoption of SOA architecture
  - Web service enablement of legacy apps
  - Format bridging, transformation and routing
  - Handling wide variety of non-XML data formats
  - Overcoming performance bottlenecks for standards based XML interfaces
  - Interfacing with partners and customers
IBM WebSphere DataPower’s role in Smart Grid Solution

- **Build a flexible, reliable, service-oriented and highly available Smart Grid architecture**
- **Enable standards based secured XML and web services transactions**
- **Support SOA architecture by providing ability for centralized governance, security policy management and implementing web services security standards such as WS-Security and WS-Security Policy**
- **Implement standards based interfaces and enable message level security**
- **Uncompromised performance with state-of-the-art security features**
WebSphere DataPower SOA Appliance Product Line

Low Latency Appliance XM70
- High volume, low latency messaging
- Enhanced QoS and performance
- Simplified, configuration-driven approach to LLM
- Publish/subscribe messaging
- High Availability

Integration Appliance XI50
- Hardware ESB
- “Any-to-Any” Conversion at wire-speed
- Bridges multiple protocols
- Integrated message-level security

B2B Appliance XB60
- B2B Messaging (AS2/AS3)
- Trading Partner Profile Management
- B2B Transaction Viewer
- Unparalleled performance
- Simplified management and configuration

XML Security Gateway XS40
- Enhanced Security Capabilities
- Centralized Policy Enforcement
- Fine-grained authorization
- Rich authentication
DataPower Usage Patterns

Integration & Governance
- HTTP XML REQ
- HTTP XML RESPONSE
- LEGACY REQ
- LEGACY RESP
- Web Services
- Client or Server
- Web Server
- Application Server
- ITCAM for SOA
- Tivoli Access Manager
- Federated Identity Manager
- XI50
- IP Firewall
- Application Server

Security
- Internet
- IP Firewall
- Application Server

Acceleration
- Client or Server
- Internet
- XA35
- Application Server
- Web Server
- XML XSL
- XML HTML WML

MIRACLE SOFTWARE SYSTEMS, INC.
Examples of Client value achieved

- More than 600 Customers Worldwide using IBM WebSphere DataPower Appliances

Examples of Customer Web Service & SOA Integration Results

- Bullet-proof all web service messages to enforce security policies
- Achieve ROI in 6 months
- Retire 120 application servers to remove wasteful spending
- Slash CPU utilization by over 50%
- Secure internal and external web services messages
- Improve throughput by 100x and lower costs
- Reduce Enterprise Service Bus server farm by 75%
- Simplify deployment: 6 month project done in 6 weeks
- Project $10 million savings over five years
Miracle Software Systems Inc founded in 1995, is a Global Systems Integrator with primary focus on Business Integration, SOA, B2B and Social Software with Global Development Centers across USA, India, Australia, UK, Canada and Singapore.

Financially stable US Incorporated Private Company with Minority Status

Miracle Software Systems is a Premier Business Partner and is a Diamond Sponsor of this event (Impact 2009).
Contact Information:

Amit Deo

Integration Architect

Phone: 1-248-233-1515

adeo@miraclesoft.com

http://www.miraclesoft.com

You can download this presentation from our website @

Disclaimer

- The contents of this PowerPoint presentation and the related views expressed by the speakers at IMPACT 2009 are solely the views of the authors and speakers and their respective entities, and do not necessarily reflect the opinions, views, or beliefs of any other person or entity, implied or otherwise. Accordingly, all correspondence concerning this presentation should be sent directly to the named speakers.

- IBM, WebSphere, DataPower, WSRR, IT CAM for SOA, Tivoli Access Manager, Federated Identity Manager, XI50, XS40, XA35 are registered trademarks or trademarks of International Business Machines Corporation in the United States, other countries, or both.