STATE OF NEW YORK DEPARTMENT OF PUBLIC SERVICE

Advanced Metering Infrastructure Technical Conference

April 14, 2008

Long Island Power Authority
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Presentation Outline

- LIPA
- Roadmap / Vision
- “Smart Grid” Attributes
- Steps along the Road
  - Architecture Integration
  - System Automation
  - AMI Deployment
- AMI ➡ Smart Grid
  - Functionality of AMI
  - Business Environment
  - Technical Requirements

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LIPA

- LIPA is a NYS Authority established in 1998 as the primary electric service provider for LI
  - 1207 sq. mi. *(roughly 100 miles by 12 miles)*
  - Nassau, Suffolk and the Rockaway Peninsula
- Population of about 3 million
  - 1.1 million residential customers
  - 100,000 commercial customers
  - Since 1998, 5.7% population growth *(172,000 more people)*
- $2.0 billion invested in system upgrades and improvements
- LIPA owns the assets
  - All T&D operations and most IS systems are outsourced

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LIPA

- Generation
  - On island – 4,940 MW
  - Tie Lines – 2,362 MW
- Transmission
  - Primarily 69 kV and 138 kV
  - 345 kV, 33 kV, 23 kV (54 miles)
  - 177 substations
  - 986 miles overhead
  - 277 miles underground
- Distribution
  - 770 13.2 kV circuits
  - 124 4 kV circuits
  - 142 substations
  - 8,904 Overhead miles
  - 4,228 Underground miles
  - Primarily an open-looped radial system
  - 535,000 utility poles
- Load
  - Peak of 5,267 MW (August 5, 2005)

Roadmap / Vision

The System

1998
- Minimal Intelligence
- No automated interconnections between feeders
- Minimal Customer Interaction

2005
- Deploying IB to enhance asset management and operations
- Stand Alone Intelligent devices
- Remote operated interconnections between some feeders
- Minimal Customer Interaction

2015
- Enhanced systems of Intelligent devices
- Real time system monitoring
- Most feeders with automatic interconnections
- Real-Time Pricing data available to customers

2025
- IB affects the way business is done
- System configuration responsive to system conditions and end users actions
- Integrated systems of Intelligent devices

Business Environment

1998
- Manufacturing and conventional office space
- Non-automated, non-intelligent homes

2005
- Intelligent building automation
- Moderate power density in office spaces
- Moderate need for high quality power (digital requirements)
- Minimal interaction with homes

2015
- Highly Intelligent Building automation
- High power density in office spaces
- High need for high quality power (digital requirements)
- Interaction with customers on energy usage
- Some automation controlling home devices

2025
- Full two-way cooperation with customers on energy usage
- HIGH power reliability and quality
- Customers making energy usage decisions based on system information

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“Smart Grid” Attributes

- Integration Bus system for effective performance and risk management:
  - Changing the ways we do maintenance and operations
    - Dynamic real-time operations and asset management
  - Dynamic and continuous performance risk assessment for “integrated” O&M and AM;
  - Timely and accurate performance risk and management reporting (financial, customer satisfaction, technical, regulatory compliance);
  - Company-wide data and applications integration.
- Seamless, transparent wholesale to retail transaction:
  - Right supply with best price;
  - Participation in multiple energy markets (NYISO, PJM, etc.);
  - T&D system capability to accept and deliver energy seamlessly.
  - Energy management through direct customer interaction
- Dynamic Re-Configuration of the grid:
  - Significant distribution automation;
  - Real-time control of the electrical system.
- 360 degree view of the customer:
  - Customer Centric
  - Responsive to customer’s needs
  - Combined view of consumption, programs, billing, complaints, outages, scheduled work, customer profiles.
- Ability to manage resources (supply, human capital, T&D assets, etc.):
  - Anticipate resources needed (forecasting);
  - Measure how effectively resources were used.
- IT Investment risk mitigated:
  - IT path clear;
  - Standards-based architecture
- System Risk Mitigation
  - Non-proprietary technology
  - Standards based
  - Future Proofing

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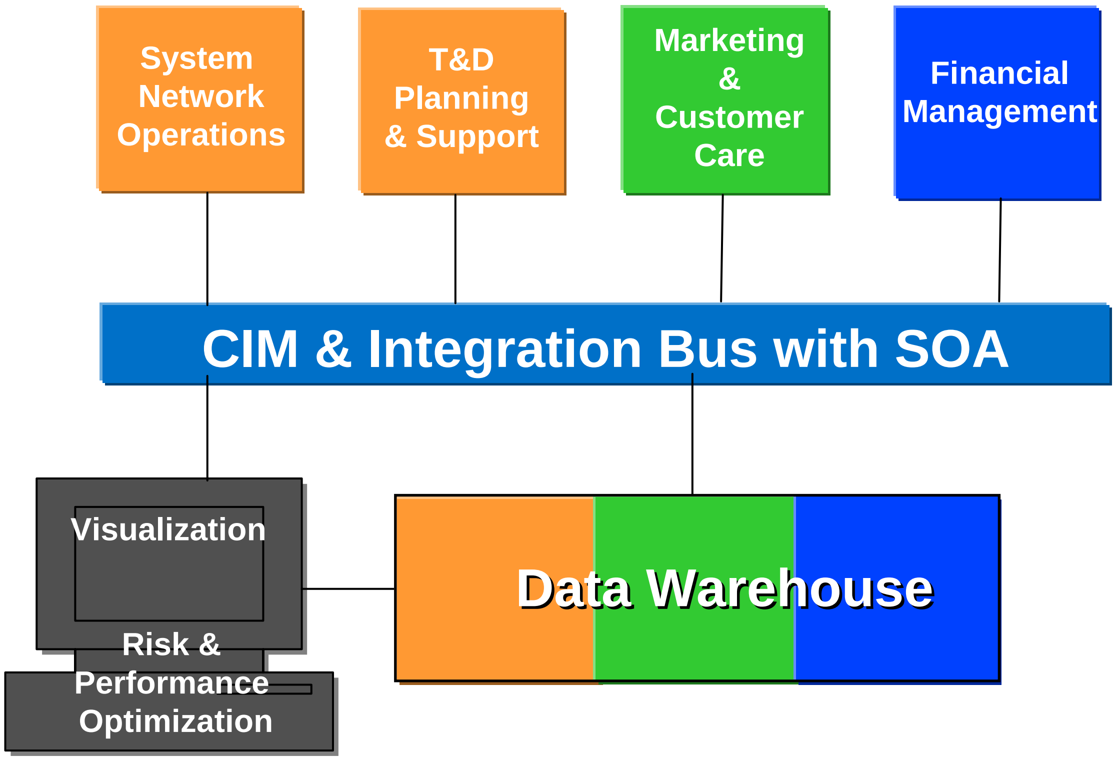
Architecture Integration

(Data and Data Management)



- IntelliGrid concept with standard-based data and systems integration;
- Common Information Model ("CIM") - leveraging company-wide data:
  - Data standardization and integration.
- Integration Bus ("IB") with Service Oriented Architecture ("SOA")- leveraging company-wide applications and automation:
  - Standard-based interfaces;
  - IB supports process automation with SOA;
  - IB SOA includes Real-Time ("RTA") and Event-Driven Monitoring ("EDM").
- Benefits of "near plug-and-play" allow for more rapid and cost effective integration.

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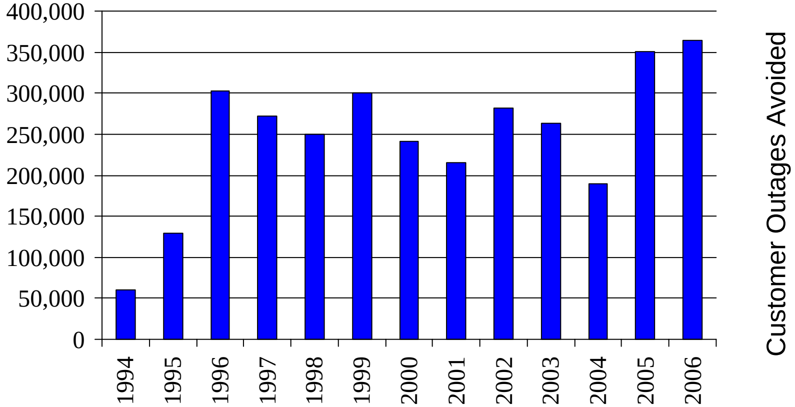
Distribution Automation

(Feeder Re-Configuration)



TYPE	Number of Overhead Circuits	Number with a midpoint ASU
13 kV	690	498
4 kV	119	6
13 & 4 kV	809	504

Year	SAIFI with ASU's (Months)	SAIFI without ASU's (Months)
1994		8.5
1995	13.6	12.3
1996	13.7	11.0
1997	16.1	12.6
1998	15.5	12.3
1999	15.1	11.9
2000	15.7	12.2
2001	15.4	12.2
2002	12.1	9.8
2003	13.5	10.3
2004	14.4	11.9
2005	14.1	10.7
2006	16.1	12.3

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AMI Deployment
(Phased Approach)

- Full Two-way communication to every meter
  - Customer interface unit
  - Display energy and demand usage
  - Two Way messaging
- Energy Management Services
  - Two way communication between the customers devices and the utilities systems
  - Turn on/off major loads
  - Pricing information
  - Load shedding
  - Customer controlled load data
  - Demand response
- Protocol
  - TCP/IP will be used between AMI sys and CIS
  - Non-proprietary software and off-the shelf server hardware
  - Remote meter programming
  - All systems, devices and communications IntelliGrid^{SM} Architecture compliant
  - Interface to existing RTUs
- Security
  - Intrusion detection and notification
  - Risk mitigation
- Readability
  - Daily reads
  - Read on Demand
  - 99.9% availability
  - Consumption directly from register
  - Visual read on register
  - Demand readings
  - Load profile recording
  - Service outage and restoration messaging
  - Location identification
  - Positive load, outage and restoration data by transformer, feeder, substation, etc.
  - Tamper Recognition and Notification
  - Remote Connect/Disconnect
    - Power limiting
- DA System
  - Sufficient capacity to provide communications for entire distribution system
  - Monitoring and control (as appropriate)
  - 30 second polling frequency

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AMI ➡ Smart Grid

- Business Environment
  - Customer needs, desires
  - Utility provided services / products
  - Requirements of state regulators
- AMI Functionality
  - Now and future
  - Future proof
- AMI Technical Requirements
  - Non-proprietary
  - Standards based
  - Communications infrastructure
    - Robust, secure, fast

- Enabling AMI without hindering deployment of a "Smart Grid"
- Vision for the attributes (current and future) of the "Smart Grid" and the AMI system
- National consensus of what the "Smart Grid" is and how AMI fits in
  - Need to look at both short term and long term
  - System must be able to adjust as market forces change
  - Accommodate regional (utility) differences
    - Business / customer attributes, needs, desires different