

Smart Grid.....Realizing the Promise

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Performance**

PowerStream Inc. - August 19th 2008

The Promise of Smart Grid



Focus

- Tech-Lite Presentation
- Our Focus:
 - The Vision
 - A Range of Possibilities
 - A Re-Imagined Customer Relationship

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PowerStream Overview

- 240,000 Customers
 - 210,000 Residential - 50% Load
 - 30,000 Commercial & Industrial - 50% Load
- Peak Demand of 1600 MW's
- 2007 Billed Consumption of 6.8 TWh
- Distribution Assets - \$ 620M
- + 80% of the Infrastructure - Post-1980's
- Service Territory – 640 sq. km.

PowerStream Service Area



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System Design

- Hybrid Transformation/Distribution Business
- Transmission & Distribution is an Integrated Whole – Not 2 Solitudes
- 10 Transformer Stations - 2 More in Design Stage
- Provide over 75% of our Own Transformation & Growing
- Primarily 27.6/16kV Network – Minimal DS infrastructure
- System Design focus – Maximize Operational Flexibility e.g. differentiated Protection Schemes, Switching
- Greater System Recovery & Load Shedding flexibility

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Our Approach

- A one-time Transformative Experience
- No Rear-View Mirror perspective
- Our Smart Grid Goal is to optimize & enhance system integration e.g. OMS, SCADA, SONET/Fibre Communications Backbone, Distribution Automation
- Key Opportunity to leverage existing assets through greater integration rather than “green-field” approach
- Key Objective - Minimize rather than increase interfaces

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Our Approach (Cont'd)

- “One-Size Fits All” is too narrowly defined
- LDC’s will pursue differentiated solutions based on design configuration, topography, customer needs, etc.
- Standardization for its own sake not an objective
- Departure from traditional “Command & Control” philosophy
- Initial step towards “Participatory Network”
- Key enabler of Customer Driven Applications e.g. DR



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Our Approach (Cont'd)

- Billing Data is a key deliverable
- Operational DataStream is of Equal Value
- DataStream Opportunities:
 - Improved Outage Mgt. – Fault Indication & Crew Deployment
 - Improved Cost Management – e.g. Trouble Call Response
 - Self-Healing – Station & Distribution Automation
 - Key Enabler of SMART Suite Metering
 - Load Balancing & Optimization
 - Improved Power Quality Management
 - Facilitate Distributed Generation & Micro-Grids

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Our AMI Solution

Strategy

- Adopted “End-to-End” Philosophy to mitigate business risk
- Transitional MDM/R in place from Day 1
- Sought Single Technology solution to minimize Interface Requirements & mitigate business risk
- Adopted “Over-Communicate” Customer focus – e.g. California Energy Commission Load Control initiative

YOUR CURRENT CONNECTION

75 to 300 square miles covered per tower



Two-way and one-way meters (water, gas, electric)



Phone Lines
ESDN
Satellite

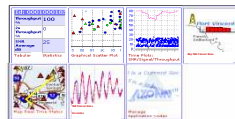


RNI
Regional Network Interface

Tower Gateway Basestation 'TGB'



System Health Management
(by Sensus)



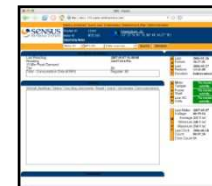
Data Warehouse
60 Day History



Utility Interface

XML File
Itron MV90, MV90 HFF
Itron Enterprise Edition
SIMS
Custom Interface

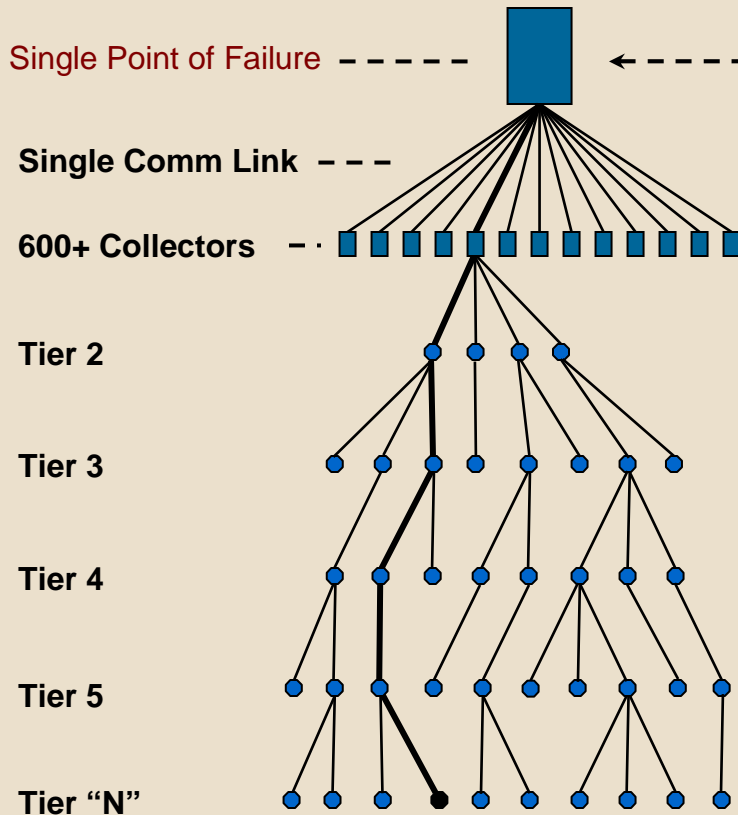
Web Functions



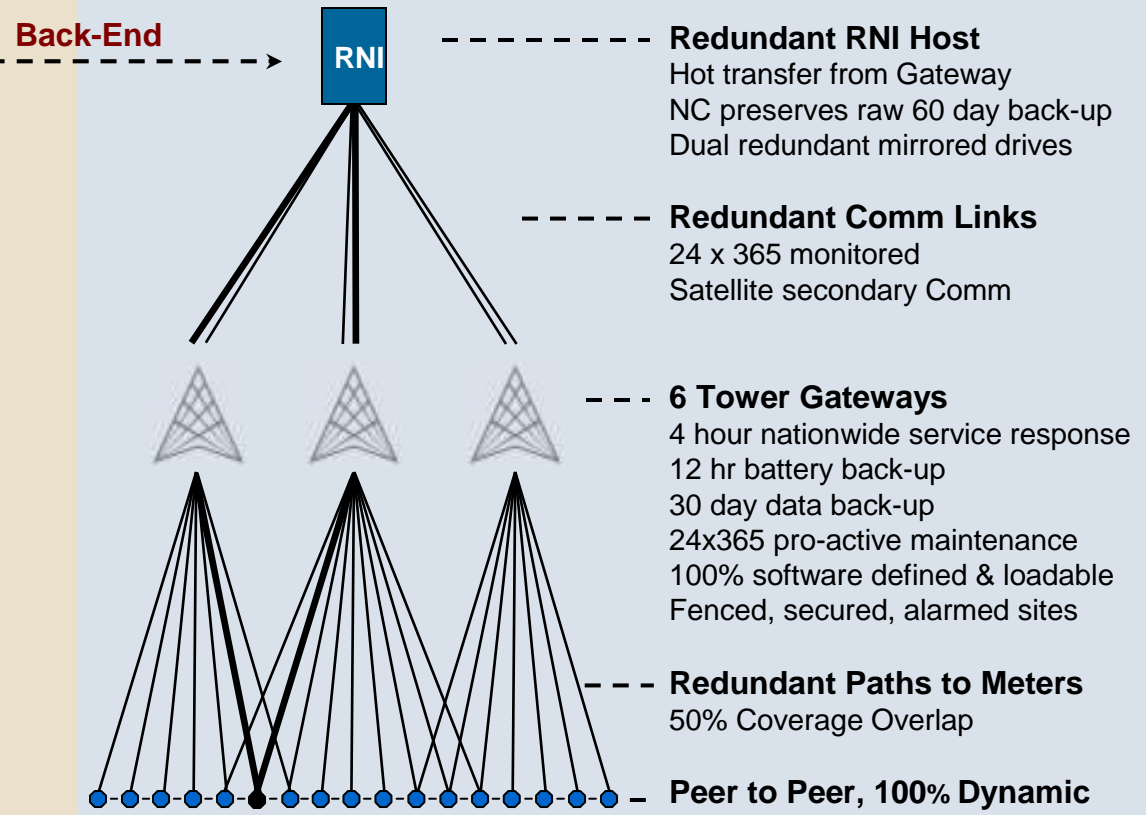


Mesh Multi-Tier

FlexNet Single-Tier



- Points of failure and maintenance distributed over hundreds of sq miles
- Node failure requires path reconfiguration, fall-back path un-assured
- Deployments must be planned around Collectors, sparse projects not practical
- Exposure to hardware creep over time



- Redundant RNI Host
Hot transfer from Gateway
NC preserves raw 60 day back-up
Dual redundant mirrored drives
- Redundant Comm Links
24 x 365 monitored
Satellite secondary Comm
- 6 Tower Gateways
4 hour nationwide service response
12 hr battery back-up
30 day data back-up
24x365 pro-active maintenance
100% software defined & loadable
Fenced, secured, alarmed sites
- Redundant Paths to Meters
50% Coverage Overlap
- Peer to Peer, 100% Dynamic
Typical meter reaches 30 peers
1 message recovers 15 reads
- Minimum points of failure (6), readily maintainable
- All redundant paths used at all times, verified at installation
- No planning of Collectors or restrictions on meter deployment
- FCC licensed; Performance guaranteed

EXAMPLE
600 Square Mi
210,000 Meters
350 Meters/Sq Mi

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Our Technology Solution (Cont'd)

- Sensus – RF Technology Point-to-Point Solution
- Service Territory has diverse Customer & Terrain mix
- Superior Communications Range – Up to 40 km
- Redundant WAN Configuration
- Water & Natural Gas Capability – Multi-Utility Convergence
- Over-the-Air Firmware Upgrades
- Full Net Metering functionality
- “Last Gasp” capability (Incl. Outage Message & Readings)

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Our Technology Solution (Cont'd)

- Superior Loss of Power Network Recovery
- Instantaneous Outage, Power Quality, Hot Socket & Theft & Tamper Alarming
- Max/Min/Average Voltage information
- Licensed Bandwidth
- Extensive User Defined Parameters e.g. Interval Specs.
- IP Addressability
- Memory: Meter (30 Days) – Tower/Collector (30 Days) - Head End System (60 Days)
- Distribution Automation Tools (Load Fault Indicators, Switches)
- HAN enabled Load Management Control

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Risks & Challenges

- AMI & TOU Implementation is a Marathon – Not A Sprint
- Requires significant Re-Engineering of Metering & Customer Service Business Processes – IT is key Enabler
- Easy to Underestimate Change Management requirements
- Measurement Canada Reverification Requirements
- SMART Meter Life Expectancy

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Risks & Challenges (Cont'd)

- LDC Billing Dependency on the MDM/R
- Effectiveness of the Consumer Education Program & TOU Impact on Vulnerable Consumers
- Management of Expectations
- Data Integrity, Security & Auditing Standards
- Narrow Focus of the AMI implementation
- Promise of the Operational DataStream **must be realised**