
Smart
The Future of ....
Energy
Utility Data
Connectivity
Network
From OZZ Energy Solutions Inc.

# OZZ Corporation

Ontario Energy Board
Smart Meter Implementation Initiative
September 17, 2004

# Open System Platform

- Open Infrastructure Standards
  - **ANSI meter communications**
  - **IEEE communications**
  - **Internet – e.g. W3C**
  - **Data Exchange – e.g. SQL, EDI**
  - **Application – e.g. Java**
- Shared Use Networks
  - **Published protocols**
  - **Multi-source of connectivity**
  - **Multiple application uses**
- Information Exchange

# SMI Proposition

- Smart Metering Infrastructure is Not Meter Reading
  - Smart Point-of-Service Device
    - Cost and Quality
  - Integral Part of the Distribution Grid
  - Opportunity to serve the consumer

# Smart Energy Value

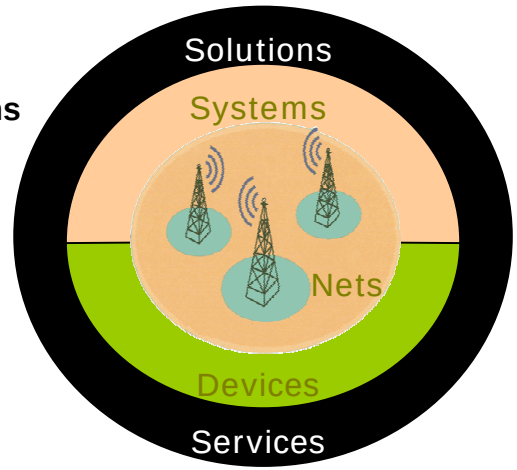
## Ontario – Responsive Distribution Infrastructure:

| | | |
|---|---|---|
| ***Smart*Grid** Infrastructure | Integrated networks using intelligent device automation | **Unified Infrastructure**<br>●SmartMeters<br>●SmartControls<br>–SmartPipes<br>–SmartWires<br>–SmartAssets |
| ***Smart*Grid** Solutions | Integrated demand response, efficiency & reliability | **Smart Solutions**<br>●Customer participation<br>●Peak response<br>●Reliability response |

# Alliance Difference

## 1. ECONOMIC FLEXIBILITY

- **Shared Infrastructure**
  - Mobile asset utilization
  - Fixed data applications
  - Mobile voice & data applications
- **Scalable Solutions**
  - High priority first
  - Layer additional projects
  - Expandable to mass market
  - Multi-utility participation
- **Economic Development**
  - Canadian labor base
  - Canadian technology
  - Ontario industry growth

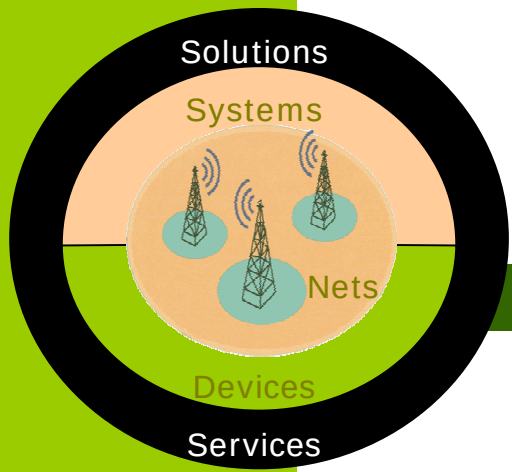



**Smart Energy Network**

## 2. RISK MITIGATION

- **Smart Network Solutions**
  - Wireless
    - For the North American grid
  - Wired
    - For addressable applications
- **Resources & Experience**
    - Utility processes & standards
  - Canadian smart metering expertise
  - Measurement Canada compliance
  - Communication network expertise
  - Energy networks issues
    - terrestrial, frequency and through put planning
  - Ontario-resident resources
- **Standards Compliance**
  - Future ready
  - Supplier choice

# SMI Requirements Input




**Smart Energy Network**

# General Considerations

- **Market**
  - Regulatory minimum that support flexible and dynamic price signals
- Operational
  - Utility and consumer features that ensure ease of operation and use
- **Future**
  - Flexibility features that allow for sustainable growth and avoidance of stranded assets
- **Performance**
  - Data quality and reliability, access-to-information
- **Standards and Compliance**
  - Maximization of Open Standards (ANSI, IEEE, etc.)
  - Hurdles to ensure participation
- **Quality of Service**
  - Outage frequency and response
- **Cost**

# Smart Meter Infrastructure

**BASIC SMI PRINCIPALS:**

- The market requirements for SMI, should anticipate an evolving market and the integrated communications relationship with energy consumer.
- Under SMI the meter should become a smart point-of-service device and an integral part of the real-time distribution Grid.
  - SMI is not AMR or Meter Reading!
  - In addition to measuring load , it must be price signal and demand response ready, reliability response, quality-of-service preventative maintenance tracking (e.g. momentary outages)
- To avoid stranded assets, SMI should be based on open systems principals using standards at every possible level, ensuring fair and equitable supplier participation both today and in the future.
- SMI should be economically flexible, minimizing the current cost burden of future features

# SMI Requirements

1. **Smart Energy Devices (meters)**
   - Interval data resident in the device
     - Hourly for residential
     - 15 minute for commercial
     - Bi-directional meter data support
   - Support variable interval periods
     - Ability to change intervals as needed
       - Hourly, 15 & 5 minutes intervals
       - Temporary granularity to support demand response periods and responsive customer EMS tools
   - 2-way communications

- **Why?**
  - Resident device allows for data recovery in the case of communication failure
  - Delivery of information to non-web connected consumer devices
  - Support for demand response

# SMI Requirement

2. **Smart Reporting**
   - Daily reporting
   - Hourly
   - Peak period
   - Outage
   - Exception
   - On-Demand
   - Real-time
     - as long as costs are considered

- **Why?**
  - Different applications sources require different reporting periods:
    - Billing – monthly
    - Customer Service – daily, on-demand
      - Customer service requests for call centers operations
      - Change of service
    - Demand Response
      - May need hourly or exception reporting for verification
    - Customer – at least daily
      - On-line customer information
    - Quality of service – event
      - Filtered reliability information to assist service restoration, preventative maintenance
    - Settlements – daily

# SMI Requirements

3. **Complete Automation Prioritizing over 50kW And Selective Demand Response Locations**
   - Geographic Coverage
     - Urban, suburban, rural, mountainous
   - Commodity
     - Electric, heat, water, gas
   - Customer Classes
     - Residential, schools, commercial, government
   - Customer Sites
     - Indoor, secure facilities, water pressure pumps, underground, high-rise, agricultural (i.e. pumps), streetlights etc.
   - Variety of Meter Types and Suppliers
     - Forms, suppliers
   - Consistency with processes & procedures
     - Labour practices, installation operating procedures, IT standards, change out, maintenance, customer communications

- **Why?**
  - **Complete automation ensure fairness, maximizes economies-of-scale**
  - **Risk mitigation**
  - **Incremental cost on 50kW priority is likely under $400 per commercial customer and can have demand response benefits 2 years earlier**
  - **Need verification information to support demand response programs, rate development and program incentives**

# SMI Requirements

4. Economic Automation
   - Capital Costs
     - Equipment, installation, integration, customer notification
   - Operating Costs
     - Communications, replacement
   - Shared Benefits
     - Ability to deliver benefits to legacy applications, new systems and applications
   - Customer/Stakeholder Accessible
     - Web access, energy display
     - Complimentary, Compatible with Controls
     - Verification reporting access

- Why?
  - Holistic costs and benefits
    - Benefits derived from all participants

# SMI Requirement

5. **Adaptable Automation – maximize infrastructure that supports demand response.**
   - Standards Compliance
     - ANSI Metering Standards
     - Interoperable Among Operating Systems and Databases
     - Data Exchange
     - Web Access
   - Remotely Configurable
     - Default and dynamic configuration
   - Remotely Programmable
     - New measurement requirements, reporting frequency, new network efficiency features, new programs and business practices

- **Why**?
  - Promotes broader participation
  - Protects against stranded assets
  - Support for unforeseeable requirements
  - Protect against operating “bugs”

# SMI Considerations

- Should the meter be a gateway?
  - Appliances
  - Load control
  - Internet access

**NOT Necessarily Required**

- As long as there other paths

**MAY BE BENEFICIAL, as long as…**

- It is economic, secure and equally-accessible and provides consumer benefit.
- As long as it is based on standards

# Summary Recommendations

- Adopt industry standards on open smart metering infrastructure wherever possible
- Advanced commercial meters with 15 minute data
- Smart residential meters with a full billing cycle of interval data and 2-way communications
- Variable reporting periods to support multiple applications and particularly demand response
- Complete automation prioritizing 50kW and demand response locations
- Maximize infrastructure that can support future needs for demand response

# End-To-End Solutions

**Back Office Integration**

**Data Systems**

**Network Connectivity**

**Smart Meter**

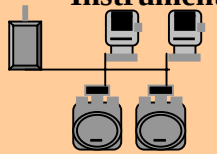
Secure Utility Intranet

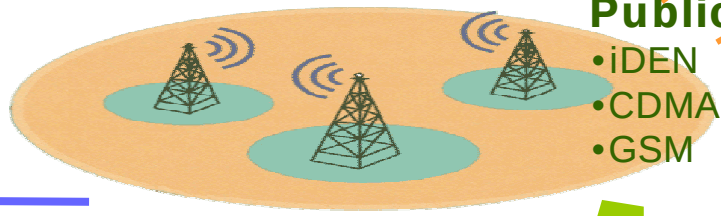
1. Private Wireless
2. Public Wireless
3. Public Telephone
4. Wireless/Wireless
5. Telephone/Wireless

## Commercial Smart Metering

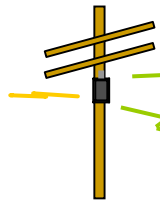
ANSI Meters

Gas Meters & Instruments

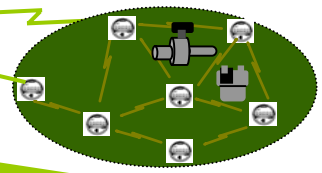




**Public**
- iDEN
- CDMA
- GSM

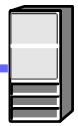


*Rural Wireless Network*



## Utility Systems

- MV-90
- LodeStar
- Billing
- EFM/SCADA
- CIS
- Other



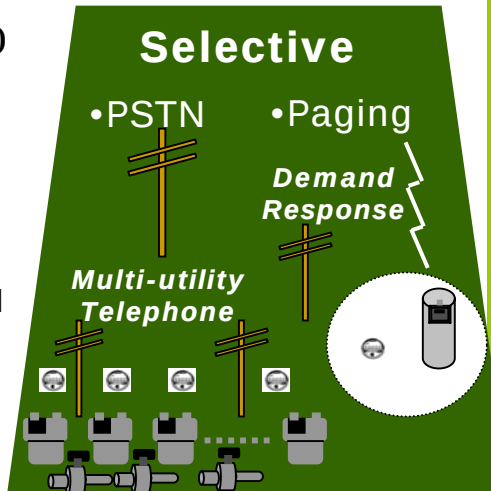
**SCADA/DA Server**
(Instrumentation & IEDs)

**Private**
- DataTAC
- iDEN

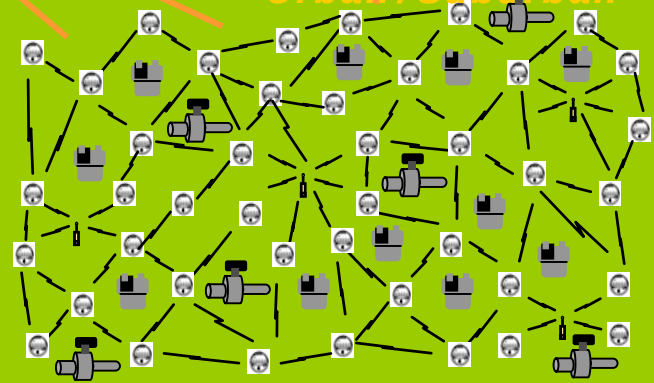
**Selective**
- PSTN
- Paging

*Demand Response*

*Multi-utility Telephone*



*Multi-utility Wireless Network Urban / Suburban*



**Smart Devices:**

Gas Meter

Gateway

Electric Meter

DR Control

Water Meter

# The Challenge
## Unify Diversity

1. **Deliver Affordable and Reliable Solutions**:
   - Multi-Utility Requirements
     - Electric, Gas & Water
   - Multiple Network Technology
     - Selective Networks – Telephone, Public Wireless
     - Shared Networks – Wireless WAN/LAN
   - New Applications
     - Commercial Smart Metering
     - Demand Response
     - Residential Smart Metering
   - Diverse Utility Legacy Systems

2. **Deliver Implementable Programs**

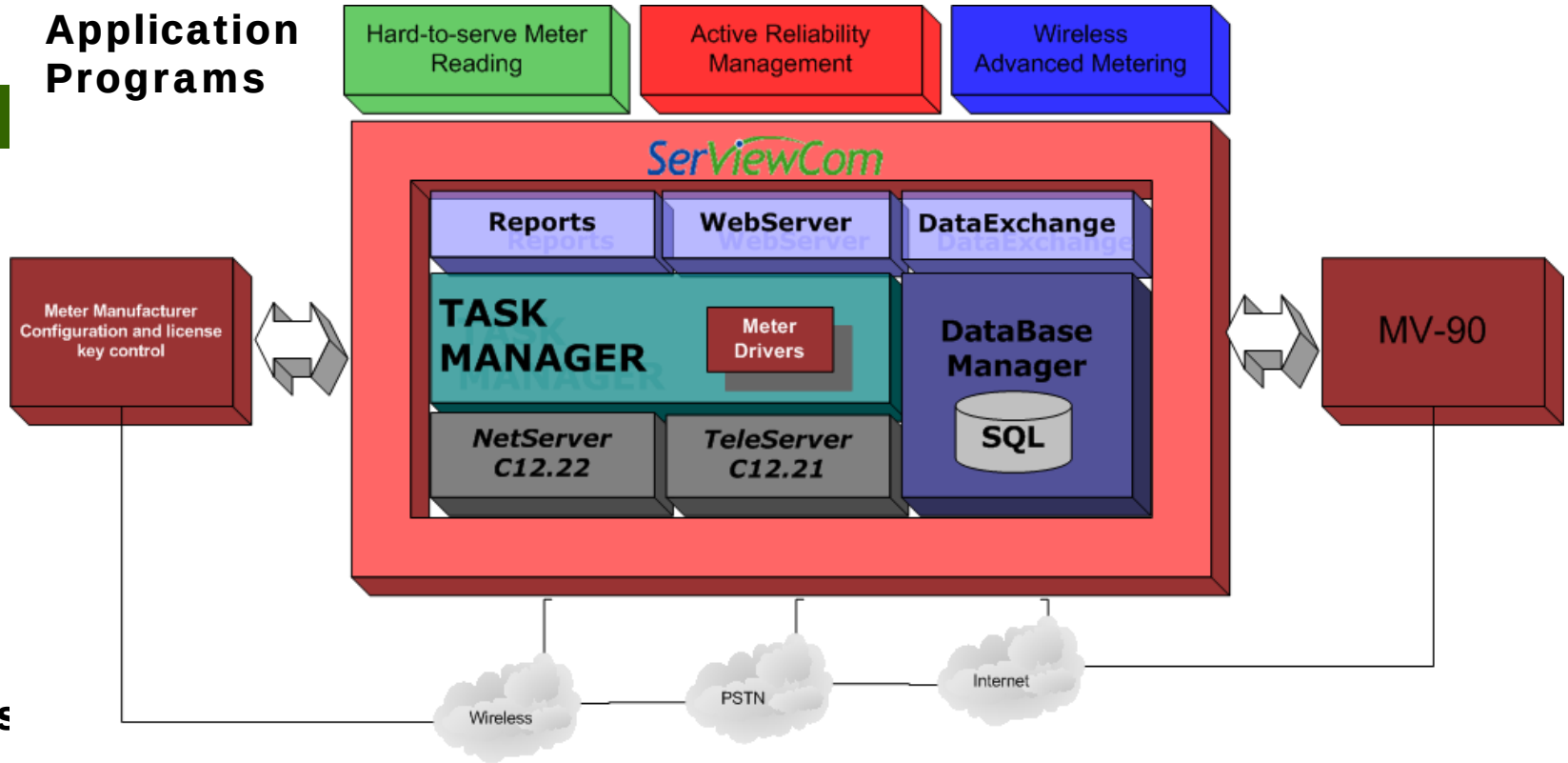
# SMART ENERGY NETWORK

**Application Programs**

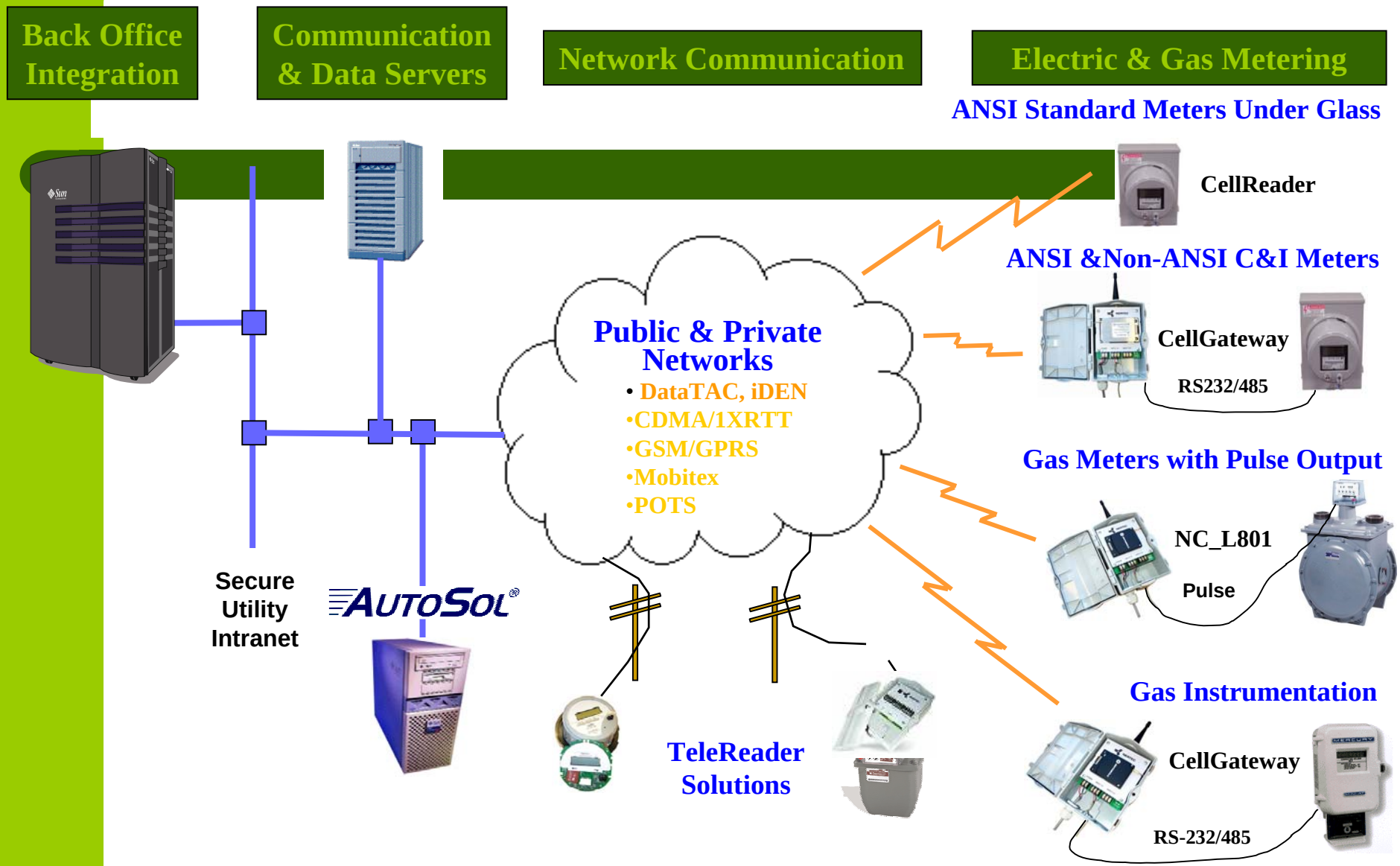
**Meter Data Systems**

**Networks**

**Meter AMR Devices**




# Commercial System Architecture



# Smart Energy Applications

**STEP ONE: Targeted Programs**

- Commercial Smart Metering (CSM)
- Residential Demand Response (RDR)

**STEP TWO: Broad Scale Implementations**

- Residential Smart Metering (RSM)

**STEP THREE: Shared, Incremental Programs**

- Share Utility Projects
- Other Fixed Applications
- Other Mobile Applications