



## The NES Smart Metering System

The World's Most  
Advanced Metering  
System Solution for  
the Smart Grid





## Making the Grid Smarter

At Echelon, we believe the smart grid is an energy network. It includes not only the electricity distribution infrastructure itself, but everything that draws power from or contributes power to the grid — such as appliances in homes, HVAC equipment in buildings, and streetlights in cities. Our smart metering solution — the NES System — is a critical part of the smart grid. A flexible, networked infrastructure, it can easily adapt to changing market and regulatory needs. It can allow new edge devices beyond the meter, new software-enabled services, and new payment and pricing models for consumers. **Only a system solution to metering can do this. Only the NES System can do this.**

# The NES System: Making the Grid Smarter

## Proven Adoption

The NES System's underlying power line signaling and communications technology drives the world's largest AMI system (over 30 million electricity meters), reducing the utility's operating costs by 500 million euros a year.

Over 1.5 million more NES meters have shipped throughout the world — an order of magnitude more than any meshed RF metering solution.

## The NES System

The Networked Energy Services (NES) System is the world's leading solution for a utility's smart metering and AMI needs. As a grid solution, it's designed to meet today's smart metering needs and support tomorrow's service demands. Built on the success of the world's first and largest AMI project (30 million homes), the NES System has changed the global landscape for smart metering. With the NES System, smart metering and AMI systems are no longer focusing on the meter, but on an energy network for a smarter grid.

## Benefits of the NES System

- **Maximizes grid intelligence** while minimizing operating costs by embedding communications and monitoring directly into the electricity grid.
- **Creates an open environment** for competitive services to adapt, modify, and extend their energy and metering services, using market-leading software, hardware, and service providers.
- **Eliminates risk** by freeing a utility to focus on its primary network asset — the electricity grid — by leveraging established, IP-based backhaul communications providers regardless of technology.
- **Delivers certainty** that the system will perform to customers' and stakeholders' expectations through a history of reliability, performance, and cost savings provided to tens of millions of homes.

## More Than a Meter

The NES System is a software-driven smart grid solution that incorporates smart meters, sophisticated grid connectors or concentrators, and system software. Together, these components meet the needs of the smart metering and AMI markets from the perspective of the grid, not just the meter. Unlike a meshed RF solution that uses an add-on communications card bolted to a meter, the NES System resides *in the electricity wires*, converting a utility's existing metering system into a smart energy network. This allows the system to provide grid intelligence — about the quality of the electricity, the efficiency of its delivery, and even the health of other assets on the wire.



## Components of the NES System

The three components of the NES System — smart meters, concentrators, and system software — are designed to leverage each other to increase the overall power of the system, balance the intelligence of the system at the points where value is highest, and provide the highest level of reliability and performance with the lowest cost of ownership.

### Smart Meters

NES smart meters meet the future market and regulatory needs of a utility by incorporating a rich set of features including prepay, multi-tariff abilities, remote updates, remote connect and reconnect, tamper and outage detection, hardware extensibility, direct relay control, software-settable service levels, and load factor monitoring. Meters can be updated with new pricing, quality of service, energy management, and monitoring and control services even after they've been fully deployed.

### Data Concentrators

These intelligent infrastructure devices let a utility leverage its NES System solution beyond AMI or smart metering. The concentrators provide a power line mesh to ensure 100% meter communications, isolate and pinpoint outage and other service issues, and minimize wide-area communications costs. They communicate with System Software located at a utility's service center over any IP-based backhaul.

### System Software

NES System Software makes integrating with new and existing enterprise applications via IT standards fast and easy. This Service-Oriented Architecture (SOA) software has been proven in numerous utility deployments.

### System Management

The NES Element Manager is the Web-based network manager for the NES System. A real-time visual dashboard,

it speeds system installation and provides summary and detailed views of system health and status to streamline operations and maintenance. The easy-to-use interface lets system administrators configure and manage a single meter or millions of meters, making it ideal for both pilot installations and full-scale system deployments.

The Element Manager integrates seamlessly with existing NES systems and is transparent to other applications. It manages the full lifecycle of NES meters

and data concentrators through the following features:

- Installation
- Meter-to-data assignment
- Performance monitoring
- Maintenance
- Configuration
- System-level diagnostics



## Proven Reliability

### Built to Grow

Residential demand response, incentive pricing, prepay service, alternative energy buy-back plans, and consumer-to-consumer energy commerce will all be future options for utilities. But utilities that have already deployed meshed RF grid solutions won't be able to add these options, since RF relies on proprietary communications technology.

The NES System imposes no such limits. To ensure maximum flexibility for future upgrades and expansion, the system is based on four open, international networking standards: ISO/IEC14908.2 for power line signaling, ISO/IEC14908.1 for the communications protocol, IP for the WAN backhaul, and SOAP/XML (Web services) for the system software API.

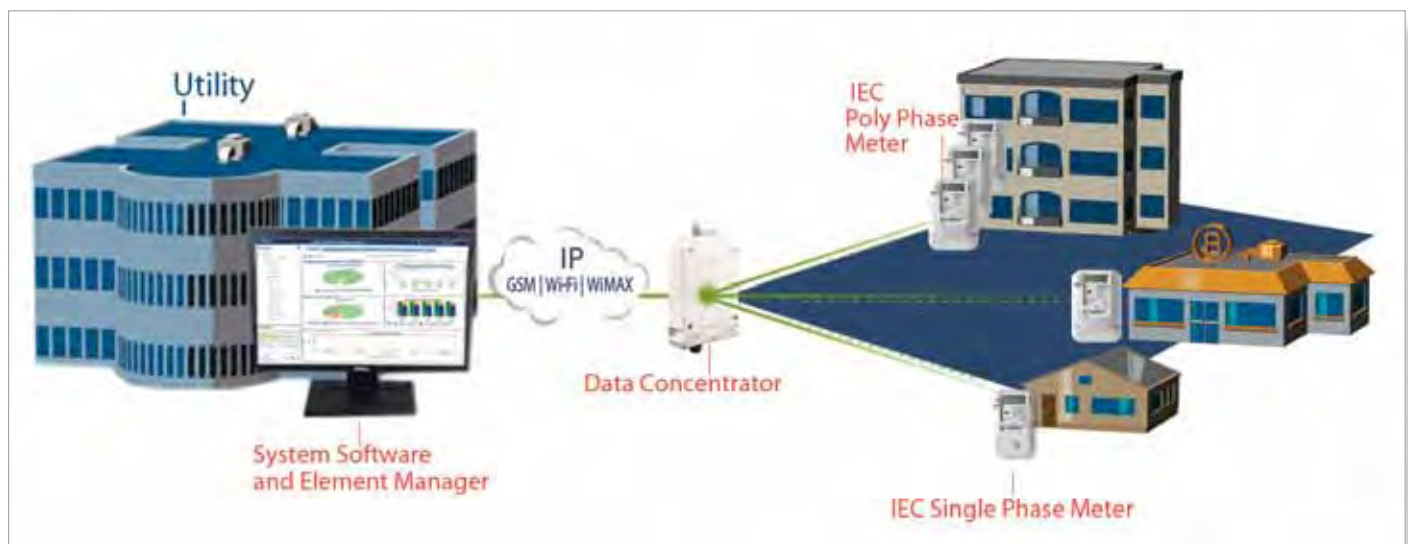
- IP-based WANs easily integrate with the NES System regardless of type, from WiMAX to GPRS modem to BPL.
- Extensions to the NES System beyond the meter use emerging RF standards like ZigBee or established power line communications standards like Echelon's LONWORKS® platform.
- The NES System ensures that a utility can provide HAN and, through the utility enterprise, use existing and emerging hardware and software standards such as ZigBee.
- The SOA system software can be used by any IT services company for fast enterprise application development.

**Swedish utility E.ON has seen a 50% drop in meter-related customer service calls since deploying its NES-based AMI solution.**

**Vattenfall AB, which deployed its NES solution over two years ago, is able to read 99.7% of its 600,000 NES meters every day and 100% of them within 48 hours.**

**Deployments show that a lack of communication with an NES meter is usually caused by a failure elsewhere in the transmission and distribution grid rather than by any part of the NES System.**

**The NES System is a software-driven smart grid solution that incorporates smart meters, data concentrators, and system software.**





### Features of the NES System

- Remote meter reading and on-demand reading
- Remote firmware updates to meters
- Load profiling
- Remote updates and configuration parameters by home, area, or service territory
- Power quality measurement and proof-of-service reporting
- Flexible, configurable tariffs such as time-of-use pricing, critical peak pricing, real-time pricing, and prepayment
- Scaling to millions of meters
- Extensible to read water and gas meters
- Direct load/ripple control
- RF extension into homes over ZigBee, M-Bus, and ModBus
- Transmission and distribution equipment fault detection
- Real-time theft and outage detection
- Remote disconnect and verified reconnect
- Net or reverse metering for alternative energy generation or microgeneration
- Grid management with remotely managed peak load limiting and detection

### About Echelon

Echelon Corporation is leading the worldwide transformation of the electricity grid into a smart, communicating energy network — one that connects utilities to their customers, and creates energy-aware homes and businesses that react to conditions on the grid.

[www.echelon.com](http://www.echelon.com)

### Proven Energy Network

The NES System delivers gas and water meter data via the NES smart meter's M-Bus connection.

The NES System is already displacing dedicated ripple control infrastructures (direct load control).

RF home services are already deployed over a wireless ModBus interface to NES smart meters.

New service and billing models like prepay energy, time-of-use billing, and tiered tariff structures are in use and can be upgraded remotely.