mUtilities

ambient®
Communications for a Smarter Grid

The Benefits of a Single Communications Platform for Enabling Multiple Smart Grid Applications

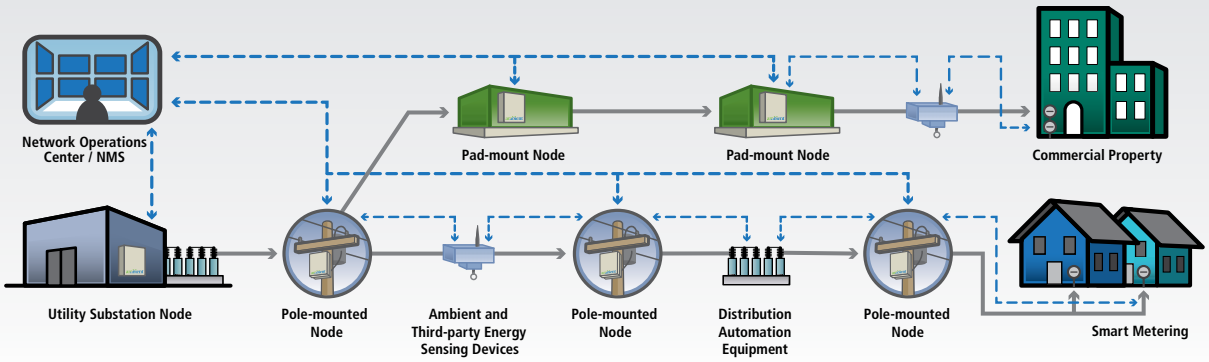
Solution Overview

As energy utilities seek to modernize their grids to cope with increased customer demand, legislative and societal pressure for cleaner energy, and the increased cost of fossil fuels, the smart grid technology market continues to grow. Innovative applications are being developed and deployed to assist the utilities to meet these challenges; whether the applications relate to smart metering, electric vehicles, distributed energy generation, or grid automation, they all require two-way digital communication.

A single smart grid communications infrastructure that can enable multiple applications in parallel will allow the utility to reduce costs of implementation, operations, and communications.

The Ambient Smart Grid® Communications platform adopts this approach. It is an alternative to the traditional "silo-ed" deployment of separate communications solutions for each grid application. The platform can facilitate communication using multiple technologies, simultaneously, allowing utilities to communicate with various end point devices for multiple applications. In addition, it provides the benefits of network visibility and control, facilitates improvements in power quality, avoids stranding legacy assets, and provides for future enhancements.

Ambient Smart Grid Communications Platform fundamentally changes the nature of the distribution grid from a unidirectional flow of energy, to a multi-directional flow of energy information.



Core Technologies

The Ambient Smart Grid Communications Platform, which includes hardware and software elements, is built using an open IP network architecture that enables utilities to pick and choose the smart grid communications solution best suited for their unique infrastructure and business objectives.

The Ambient Smart Grid Communications Node is a network device designed to support utility applications on the distribution grid. Ambient's node directly interfaces with any device with a serial or Ethernet port, and can deliver high-speed data communications using existing technologies including cellular, Power Line Communications (PLC), Wi-Fi, Radio Frequency (RF), or combinations of these protocols. Cellular networks are used to provide wide-area connectivity for the Ambient Smart Grid Nodes, along with other Wide Area Network (WAN) technologies. The nodes also provide short-term storage for data from end points (e.g. smart meters) and local analytics.

Benefits

The Ambient Smart Grid Communications Platform provides a flexible and versatile infrastructure for any utility to build its own smart grid solution and fulfill its vision most cost effectively, to the benefit of both the organization and its customers. The Ambient Smart Grid Communications Platform provides utilities with a foundation from which to build a robust and intelligent grid by:

- Providing real-time network visibility and control
- Increasing ROI for smart grid implementation
- Reducing communications and operations costs
- Avoiding stranded assets
- Providing for future development of new smart grid applications

Current Status

The largest deployment at Duke Energy, a top tier US utility company, has over 85,000 (March 2012) Ambient Smart Grid Nodes running in the field, managed by the AmbientNMS® Network Management System.

The energy provider chose a public wireless carrier for WAN communications, and a combination of protocols for last mile devices, with the Ambient Smart Grid Nodes at the core. This one common communications infrastructure with distributed intelligence is more flexible, cost-effective and capable than multiple, disparate, legacy networks.

Key Learnings / Best Practices

The smart grid deployment in Ohio boasts several generations of Ambient Smart Grid products and is considered a model in the industry.

Duke Energy is using public wireless carrier networks for its WAN based on the following factors:

- Cellular technologies are standards-based and widely used
- Economic and technical economies of scale
- Public wireless carriers use Internet-based protocols
- Duke Energy made a decision to deploy 3G-based network to take advantage of the reduced latency, higher throughput, and enhanced security, as well as the redundancy provided by fall-back to 2G
- The public wireless carrier industry will continue to invest billions of dollars into improving their networks during the entire life-cycle of the smart grid
- Benefit from advancements in serving the retail voice and data customers
- Lastly, Duke Energy expects to have greater influence on technology and price as a customer than if it were to develop its private network solution

The Ambient Smart Grid® Communications Platform

Enabling Multiple Smart Grid Applications in Parallel

Smart metering
Outage detection
Distributed automation
Distributed generation
Demand response
Plug-in electric vehicles
Distribution management

Delivering a Single Communication Infrastructure

Proven communications nodes
Dedicated network management system
Seamless installation
Field-ready for various environments
Real-time energy sensing
Hosting 3rd-party hardware and applications

Supporting Multiple Communications

Cellular
PLC (low bit-rate)
Radio frequency (900 MHz)
Wi-Fi®
Ethernet
Serial
Flexible, secure: two-way open IP architecture

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