

Ember's ZigBee Wireless Platform Enables Advanced Metering Infrastructure

Growing Need for Advanced Metering

Utilities around the world are exploring new ways to acquire and communicate consumption data for electricity, gas and water, reliably, accurately and in real time. Conservation of limited energy resources is a critical issue as costs and global warming threaten economies worldwide. Operationally, utilities also need to reduce meter reading inaccuracies and theft of service.

Advanced Metering Infrastructure

Government agencies and utilities are turning toward Advanced Metering Infrastructure (AMI) systems as part of larger "Smart Grid" initiatives to meet these challenges. AMI extends current Advanced Meter Reading (AMR) technology by providing two-way meter communications, allowing commands to be sent toward the home for multiple purposes, including "time-of-use" pricing information, demand-response actions, or remote service disconnects. Wireless technologies are critical elements of the "Neighborhood Area Network" (NAN), aggregating a mesh configuration of up to thousands of meters for backhaul to the utility's IT headquarters.

AMI and Demand Response

AMI networks used for Demand Response systems also include wireless Home Area Networks (HANs) that connect communicating thermostats, load switches, lighting systems and in-home displays to the meters (or separate gateway). During periods of peak demand, utilities use these networks to throttle high-load devices in participating homes, such as changing the thermostat setting of the HVAC system. Utilities save by smoothing out peak demand, eliminating the need for expensive generation sources; participants share in the savings through attractive rebates; and communities avoid the possibility of rolling blackouts — the coarsest form of "demand response". In other scenarios, utilities may institute time-of-use pricing schemes, where the HAN is used to communicate the current price of energy to the consumer. Smart, communicating appliances connected to the HAN can then be set to operate only during low-cost energy periods.



ZigBee – An AMI Standard

ZigBee has become the standard wireless control technology for Home Area Networks, and is being used for an increasing number of Neighborhood Area Network applications as well. ZigBee's simple, scalable, self-configuring, and self-healing mesh networking offers utilities and metering OEMs a mature, proven, multi-vendor standard they can count on.

The Ember ZigBee Platform – Professional Grade ZigBee

Ember is the ZigBee leader, delivering a series of industry firsts:

- o First fully integrated System-on-Chip combining processor, memory and radio on a single chip
- o First ZigBee coprocessor simplifying the addition of ZigBee networking to a wide range of systems
- o First ZigBee PRO Feature Set stack, enabling truly scalable, robust, and reliable ZigBee networks

Ember has proven the ability to enable scalable AMI and AMR network solutions. The EmberZNet PRO stack implements important AMI-oriented enhancements, including advanced "deep sleep" modes that minimize power consumption for gas and water meter applications, where multi-year battery life is critical.

In addition to leading silicon and ZigBee stack software, Ember also provides the software and tools infrastructure to deliver complete, robust solutions quickly. This includes reliable over-the-air software updating, complete reference applications for AMI and Home Automation devices, industry leading development tools that speed system development, and manufacturing test library options that enable high-volume manufacturing.

Ember AMI / AMR Applications

The top metering companies around the world have chosen to partner with Ember for their ZigBee solutions.

Itron OpenWay AMI Solutions (www.itron.com)

Itron has integrated Ember's ZigBee technology into its OpenWay™ by Itron Advanced Metering Infrastructure (AMI) platform. Specifically, Itron's OpenWay CENTRON smart meters are embedded with Ember's ZigBee chips and software to provide a two-way communication pathway to the home for energy load control and demand response.

"Coming from the number one vendor of electric meters in the U.S., OpenWay is crucial for enabling the promise of residential demand response. Robust ZigBee connectivity is critical to the OpenWay system. We teamed with Ember because they are reliable, easy to work with and complement our OpenWay platform."

- Arun Sehgal, product line manager for Itron's OpenWay AMI system.

Nuri Telecom, South Korea (www.nuritelecom.com)

NURI Telecom's AiMiR meter reading system uses Ember's ZigBee system-on-a-chip and EmberZNet networking software to create a wireless mesh network for remote metering. Göteborg Energi AB in Sweden has chosen NURI for its 270,000 home AMI system, making it the first to cover a whole city with a wireless ZigBee infrastructure for the metering services of tomorrow.

"The ZigBee network can also be easily expanded as new homes are built, or new services need to be added. We partnered with Ember because its ZigBee platform is the most mature and has proven itself repeatedly in previous NURI AMR deployments."

- Gab Sub Kim, NURI CTO

Holley Metering (www.holleymeter.com)

Ember customer Holley Metering Ltd. (HML) is the top electricity meter manufacturer and AMR system/solution provider in China. Holley Metering plays a vital role in the local economy, occupying approximately 30 percent market share in China. For the quality goods and services offered by the company, HML was awarded "China Top Brand" in 2003.

"As China's leading electric meter exporter, it was critical that we base our AMR system on a widely adopted industry standard. We partnered with Ember because it had the most mature ZigBee platform, enabling us to reduce our product development time dramatically."

- Dr. Wu Yue, director of R&D center of Holley Metering, ZigBee AMR system project manager.

ZigBee: A Standard for AMI

- o Mature, stable, open multi-vendor standard
- o Self-configuring, self-healing mesh networking
- o Strong security with build-in encryption
- o Standard messaging through emerging AMI Profile
- o Proven, robust coexistence with other wireless technologies

Ember's Complete ZigBee Platform

- o Silicon – EM250 and EM260
 - First ZigBee SoC and ZigBee Co-processor
 - Leading 2.4GHz radio performance
- o Software – EmberZNet PRO
 - First ZigBee PRO Feature Set stack
 - Most mature, robust, and reliable implementation
- o Tools – InSight Development Environment
 - AppBuilder for ZigBee Certified HA products – fast!
 - Integrated debugging from 1 chip to 100's of nodes

EmberZNet PRO - Professional Grade ZigBee

Enabling ZigBee Networks that are:

- o Larger – proven to 100's and 1000's of node
- o Denser – robust in high density topologies
- o Lower Power – advanced "sleep" for battery operation
- o More Mobile – seamless movement of nodes
- o More Secure – network and link-level encryption
- o More Resilient – interference avoidance and tolerance reliable co-existence

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