

# Development is Ramping up for ZigBee<sup>®</sup>, IEEE 802.15.4 and Related Systems

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**U**ltra-low power, short-range wireless systems with modest data rates meet the requirements for many sensor and control networks. Such networks can replace wired networks, allow the placement of nodes where wiring is difficult, or simply make it possible to reconfigure networks quickly and easily.

The primary transmission standard for these systems is IEEE 802.15.4. A specialized applications superset of the 802.15.4 specification, ZigBee<sup>®</sup>, is a voluntary industry standard that is intended to assure interoperability among various manufacturers of system hardware. Where interoperability is not essential, such as a turnkey system from a single vendor, the basic 802.15.4 standard, or a customized variant, may be used.

Significant deployment of these types of systems is now underway, with many moderate-scale and demonstration systems in operation. Large scale systems are just beginning to come on line, both commercial and residential.

## ZigBee Developments

The ZigBee Alliance ([www.zigbee.org](http://www.zigbee.org)) is the industry organization for the promotion of that standard and coordination of compliance among users (similar to Wi-Fi).

The organization reports that a diverse ZigBee powered Home Area Network (HAN) is on display at CenterPoint Energy Houston Electric's Technology Center. The display features ZigBee-enabled electric and gas meters from Itron, ZigBee-enabled programmable controllable thermostats (PCT) from Computime, Control4, Hunter Fan Company, Golden Power Manufacturing/Radio Thermostat Company of America and Trane, along with an energy management web portal from Tendril Networks. The system demonstrates the capabilities of smart power management, and also shows how products from different manufacturers can all operate in a networked environment.

The ZigBee Alliance is also promoting the standard for multi-purpose home networking, not just power management. The home automation (HA) profile for ZigBee allows reliable and interoperable home

automation applications to be developed by product manufacturers for consumers. The Alliance is making publicly available its ZigBee Cluster Library (ZCL), which provides engineers with the building blocks for applications with common needs, reducing development effort.

HA provides standard interfaces for the control of lighting, HVAC, power outlets, motorization, security, audio/video and other devices. It maximizes the technical strengths of ZigBee including the use of the globally available 2.4 GHz band, self-organizing and self-healing mesh networks, and operational co-existence with Wi-Fi, Bluetooth and other systems.

## IEEE 802.15.4 Applications

Many applications do not need the certified interoperability of a standard like ZigBee. A company may wish to develop a proprietary application for either performance or competitive reasons. The IEEE 802.15.4 standard offers a baseline that can be expanded for use with different messaging protocols. Turnkey systems for commercial HVAC and lighting are a key application type for proprietary networks, as are personnel access and security systems.

## Component Availability

The manufacturers of ZigBee and other IEEE 802.15.4 systems have a wide range of products to choose from. Chip sets are offered by Atmel, Freescale, Texas Instruments, Chipcon and others.

OEM modules provide system designers with complete ZigBee/802.15.4 radios and digital interfaces. They are offered by California Eastern Laboratories, AeroComm, Radiocrafts, Cirronet, Digi International (Maxstream), and numerous other manufacturers.

Control and monitoring systems using this standard are actively being designed and deployed. These systems are expected to become commonplace in both commercial and residential settings. There are only a few concerns that full-scale wireless control systems will experience unforeseen problems, since issues such as operation in the presence of potential interferers have been well-studied.