The ZigBee impact

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Your home and office contain a host of technologies working to improve the way you live. From monitoring energy intake and usage, to controlling your appliances and lighting, ZigBee is a protocol that is changing the way we live — and in some cases, we don’t even realize it.

ZigBee is the only standards-based wireless technology designed to address the unique needs of low-cost, low-power wireless sensor and control networks in just about any market. It provides connectivity for equipment that needs battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. ZigBee can be used almost anywhere, is easily implemented, and needs very little power to operate (considering it spends most of its life snoozing).

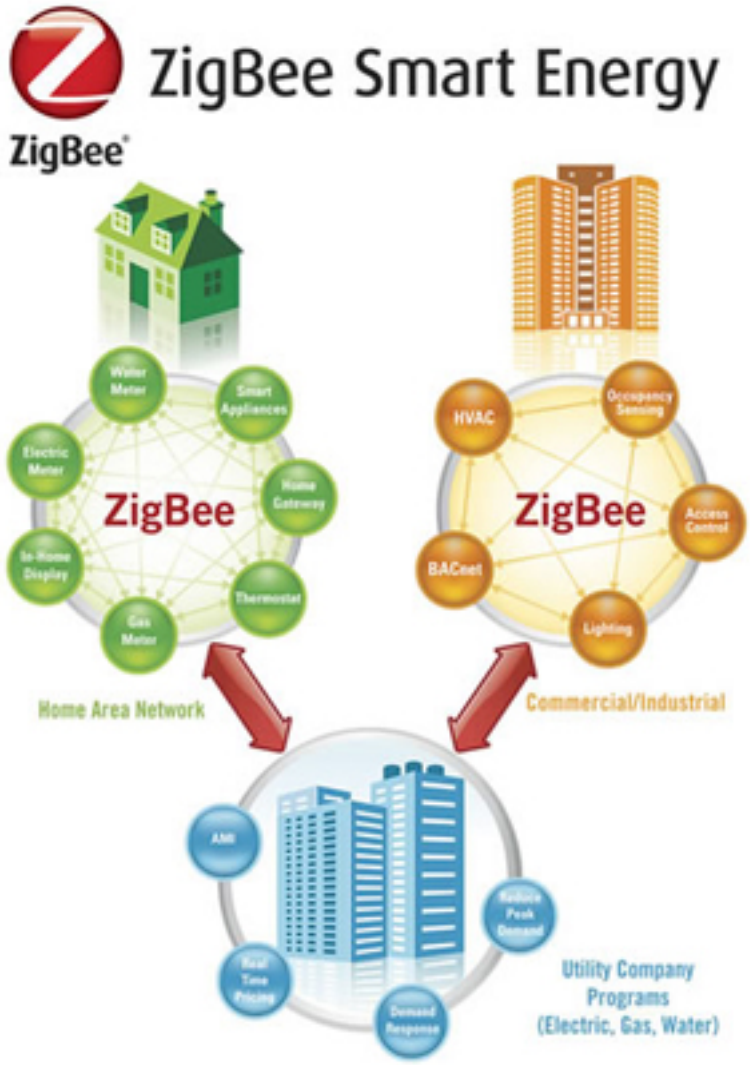
The ZigBee standard
The need for self-organizing ad-hoc digital radio networks caused the movement to unfold in 2003, when the ZigBee Alliance partnered with IEEE to create the ZigBee standard, the IEEE 802.15.4-2003. Since then, it has been superseded by the publication of IEEE 802.15.4-2006.

The foundation of every ZigBee standard and specification is the powerful IEEE 802.15.4 physical radio standard operating in unlicensed bands worldwide at 2.4 GHz (global), 915 MHz (Americas), and 868 MHz (Europe). It delivers raw data throughput rates of 250 Kbs at 2.4 GHz (16 channels), 40 Kbs at 915 MHz (10 channels), and 20 Kbs at 868 MHz (one channel). Transmission distances range from 10 to 1,600 meters, depending on power output and environmental conditions, such as other buildings, interior wall types, and geographic topology.

Future product design
So what does this protocol mean for future product designs? We asked the experts in the field.

Bob Heile, Chairman at ZigBee Alliance replied, “The ZigBee Alliance has three standards designed to spread energy efficiency: ZigBee Smart Energy — the world's leading standard for interoperable products that monitor, control, inform, and automate the delivery and use of energy and water; ZigBee Home Automation — offers control appliances, lighting, environment, energy management, and security; and ZigBee Building Automation — secure and reliable monitoring and control of commercial building systems that screen energy use and many other functions in a building.”

“ZigBee Smart Energy is inside an estimated 50 million smart meters in deployment using this standard, and utilities are starting their in-home roll-outs, giving consumers access to new energy information and control options. It helps create greener homes by giving consumers the information and automation needed to easily reduce their consumption and save money, too. ZigBee Home Automation creates smarter homes for the do-it-yourselfer who wants to boost their energy efficiency now versus waiting for their utility. It offers control of appliances, lighting, environment, energy management, and security. We know that smarter homes allow consumers to save money, be more environmentally aware, feel more secure, and enjoy a variety of conveniences that make homes easier and less expensive to maintain,” said Heile.



Yong Fang, Marketing Manager at Murata Wireless Solutions stated, “For applications that need low-power wireless solutions in IMS band, ZigBee is a good candidate. The product with ZigBee can be powered by a battery and can last for months to years before battery depletion. ZigBee is already shipped within all the smart meters in the US. Together with the ZigBee enabled digital programmable thermostat, HVAC load controller, and smart plug, end customers will be provided with almost real-time information about the power consumption and the consumption sources. This will definitely help the energy savings.”

Dan Lemos, President at Lemos International said, “ZigBee is a wireless network protocol that is designed to be used with low-data rate sensor and control networks. Thus, ZigBee nodes are energy efficient in that they aren’t required to be on the job all of the time. In fact, well-designed ZigBee networks do a lot of sleeping, which conserves energy.”

“ZigBee radios are typically very compact and so are their power sources. This physical attribute makes ZigBee radios easy to embed in most any sensor-based design. The typical ZigBee node does more sleeping than working; a ZigBee node’s battery can power the node for very long periods of time. Any data that is pushed around in a ZigBee network can also hitch a ride in IP-based datagrams. That means a remote ZigBee network can also be monitored via the internet using protocols such as TCP/IP and UDP. The ability to encapsulate ZigBee data into IP datagrams

allows low-power ZigBee networks to exist almost anywhere. With the ability to be remotely monitored and controlled, low-power ZigBee sensor networks can replace less energy efficient Ethernet-based sensor networks. Legacy wired networks using RS-485 and RS-232 as data carriers can also be displaced by a ZigBee network," replied Lemos.

IEEE 802.15.4 simplicity has benefits

The IEEE 802.15.4 standard is a simple protocol for lightweight wireless networks, yet boasts numerous benefits, including but not limited to low cost, low power, easy integration, and excellent efficiency. ZigBee technology takes full advantage of the IEEE 802.15.4 standard and adds the logical network, security, and application software. Customers do not have to be tied to intricate, costly proprietary solutions that increase their design time. They can use a standards-based solution, such as ZigBee technology.

Dan Lemos commented on the benefits, "IEEE 802.15.4 networks are simplistic networks that move small amounts of data over long periods of time."

Bob Heile replied, "ZigBee remains the only standards-based wireless technology that was specifically conceived and precisely designed to provide low-cost, very low-power wireless sensor and control network solutions for the widest variety of devices. The ability to connect up to 65,000 devices into a single network is unbeatable. Super-efficient networking that allows products without a power source to use a common household battery for many years is unprecedented. These benefits are ideal for creating the Internet of Things."

The IEEE 802.15.4 standard, otherwise known as ZigBee, is making waves across the board. Engineers are altering their designs to include the emerging technology in their products. This is not just due to the benefits. The pure simplicity of ZigBee is having a great impact as well. From your home to your office, ZigBee technology is impacting the way you live — when it's not sleeping, that is.

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