

ZigBee – the future is wireless?



ZigBee has emerged as the 'next big thing' in wireless technology. Between Bluetooth and RFID in terms of capability, ZigBee can network the micro-controllers found in so many of the products we buy – with around seven billion embedded in 2005 alone. It should enable a much wider range of wireless products – from sensor networks to ventilation controls, coffee makers to light switches.

ZigBee, named after the honeybee's communication technique, is a networking protocol that sits on top of globally standardised radio devices. For the semiconductor industry, this will lead to a huge new market for the chips required to produce such cheap networking hardware. For the product developer, ZigBee will transform current product design and reveal unexplored opportunities.

However, ZigBee is not without its challenges. Wholesale, retail and maintenance operators must move from wires to 'logical' radio devices. Installing lighting, for example, will depend on programming the software between light and switch, rather than making a physical connection. Building and system architects must fully understand the implications of using ZigBee, and product developers will need to bring users into the design process more, to avoid support problems.

Highly profitable new revenue streams await those who adopt best practice in radical new technology introduction. As the first ZigBee compliant devices are announced, Sagentia, with expertise in ZigBee technology, product design and business strategy, is on hand to guide clients through what for many will be uncharted territory.

The science

ZigBee can operate in the 2.4GHz band globally using sixteen 5MHz channels, and is capable of transferring 250kbps of raw data. It can also be used at 915MHz (Americas) and 868MHz

(Europe) at reduced data rates. It supports several networking architectures, including peer-to-peer, cluster tree and mesh – ZigBee specifies network layer, Application Interface layer and additional security on top of the MAC and PHY layers of the IEEE 802.15.4 wireless standard. Application and Transport layers are undefined in the standard: some software stack vendors implement their own versions, whereas others leave the developer to define them. ZigBee Network Co-ordinators can support 216 nodes. They can be networked together to create theoretically unlimited network sizes, but managing such large networks will raise important issues of throughput, collision and reliability.

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