

# Zigbee Market Evolution.

**eklektek Ltd.**



Convergent Thinking

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## Introduction

Over the coming decade embedded computers will proliferate, appearing in unexpected places such as light switches, toilet cisterns and garden sprinkler systems. Anywhere there is an opportunity to waste a resource of value. Data from these devices will not be communicated via wires, this would be too expensive and restrictive; Wireless is the solution.

This is a new class of short link wireless applications, targeting monitoring and control, not previously considered viable or interesting for the mass market. However as the prices of our commodities increase, so tighter monitoring and control moves from a being luxury to a necessity.

Consider the half time interval during a world cup football match, thousands possibly millions of the kettles get switched on creating a huge demand for energy over a relatively short period. To meet this demand power stations have to be maintained on standby at considerable financial and environmental cost. Zigbee enabled appliances, such as refrigerators, ovens, dishwashers and washing machines, all communicating within the same wireless network could be switched off until the kettle boils, thus balancing energy demand locally.

Conveniently the technology required to implement these applications is available now at a viable price.

A numbers of factors have permitted this:

- Advances in low power electronics, permitting the creation of an entire system on a single chip. (SOC)
- The development of large capacity flash memory devices as used in iPods.
- Simpler wireless protocols requiring smaller stacks delivering longer battery life.

Employing extremely low power technology means it may not be necessary to replace batteries. Zigbee nodes will be able to use energy scavenging techniques. Getting energy from solar, thermal and [kinetic sources](#). However scavenging is likely to require another minor evolutionary step. In the mean time we'll have to tolerate battery life of around 2 years.

## Microcontroller companies

The initial Zigbee solutions consisted of two devices a microcontroller and Zigbee RF interface. However a more viable solution combines a microcontroller and RF interface within the same package reducing, material handling and manufacturing cost

Wireless enabling many more products will fuel the low end embedded market. In 2005 almost 7.5 billion embedded processors (microcontrollers) were shipped. Only a fraction of these where wireless enabled. Companies in this market such as MicroChip and Atmel are set to benefit from this class of application providing very low power embedded microcontrollers. A microcontroller is a micro processor combined with Flash memory

(the type of memory used in MP3 players), converters and others on chip interfaces to communication with the real world.

### **Zigbee Interface companies**

Companies providing the Zigbee wireless Interfaces have grown very quickly attracting a range of partners and investment. A Norwegian company [Chipcon](#) (founded in the late 90's) was the first to market with a Zigbee wireless interface. It was acquired by Texas Instruments (TI) early in 2006. [Ember Corporation](#) (founded in 2001) obtained its Zigbee IP from Cambridge Consultants was also fast to the market. Both companies together with FreeScale (a Spinout from Motorola) and [Jennic](#) (former CSR competitor) have introduced System in a Package (SIP) devices incorporating a micro controller and RF interface, reducing the bill of materials and manufacturing costs.

Existing microcontroller vendors need to be wary that delaying the introduction of their own single package Zigbee solution could effect their sales as customers grow to expect wireless connectivity as a default feature.

### **Application developers**

Many of the Zigbee device pioneers have been startups, however the application developers are very diverse. They range from startups like [Lusora](#), targeting the monitoring and warning market for the elderly, medium size companies such as Eaton with its [Home Heartbeat product](#), through to the giants like Cisco. Motorola was quick to see the potential, it produced a demonstrator combining Zigbee and a mobile phone, in the middle of [2004](#). Larger companies have watched the technology and the market develop and are now starting to take interest. Cisco can see that Zigbee will provide the applications necessary to drive the adoption of its IPv6 technology (The current Internet being built on IPv4) IPv6 will expand the Internet address space to a level that will support the billions of networked devices, providing all Zigbee devices with a unique address.

### **Zigbee Market Evolution**

The real explosion in the exploitation of Zigbee will only come when Zigbee is incorporated in Mobile Phones. However there could be some resistance. Bluetooth the main short link wireless technology deployed in mobile phones was conceived and initially promoted by Ericsson a mobile phone company. Other players in the potential market such as Nokia, IBM and Toshiba demonstrated an interest and the Bluetooth Special Interest Group (SIG) was formed. The evolution of Zigbee standard has been different.

Zigbee technology consists of two parts; the [IEEE](#) (the American Institute of Electronic and Electrical Engineers) defined the first part, a specification called 802.15.4 which defines how the radio spectrum is used and how the lower layers of the protocol operate. The second part, called the Zigbee Specification was defined by the [Zigbee Alliance](#) (a group of companies). It defines the application aspects of the standard, driven by commercial and technological pragmatism and the need to maintain low power consumption. The main driver being applications for industrial, domestic monitoring and

automation. For this reason there could be some "Not designed here resistance" when Zigbee gets on to the radar of handset manufactures such as Ericsson and Nokia. However if and when handset manufactures decide to adopt Zigbee, time to market could be fast. TI produce the [OMAP platform](#) which is at the heart of the majority of Nokia's phones. TI's recent acquisition of Chipcon will enable it to add Zigbee when customers demand it. However a Zigbee food chain is a prerequisite, there needs to be a sufficient number of Zigbee enabled devices, within the domestic environment, before companies like Nokia will be convinced that the addition of Zigbee will result in greater sales. This requirement will be assisted by products like [Home Heartbeat](#).

Incorporation within mobile phones needs to be carried out with close attention to detail. The lessons learned from the implementation of Bluetooth on mobile terminals needs to be recalled and applied. Handset manufactures must get their software vendors to package applications in an intuitive way. Customers, like the potential applications for Zigbee, will be extremely diverse, a broad range of ages and abilities, hence applications writers must try hard to achieve intuitive simple usability if the technology is to gain acceptance.

### **Conclusion**

Skillfully marketed Zigbee is a technology that could find its way into handsets from the new generation of handset makers, such as Apple and Vodafone/Softbank. They are bold enough to seek and target the growing population of older customers who could benefit from home automation. Vodafone has demonstrated some sensitivity in this area with the introduction of [Vodafone Simply](#).

Zigbee defines the beginning of a new era targeting the networking of low value commodity products, many of which are responsible for the consumption of resources many times their own value during their lifetime. Zigbee offers developers the opportunity of finer grained monitoring and control leading to smarter and greener products at a viable price.

However Zigbee is destined to remain relatively obscure until mobile phone manufactures identify its potential. Phone makers require a critical mass of Zigbee devices to exist, or confident forecasts for the near future. So far there are positive signs, both Korean handset maker [Pantech](#) and Motorola have demonstrated prototypes and hardware platform maker TI has recently acquire Zigbee technology. However companies like China's [TCL](#) which manufactures domestic appliances and mobile phones are best positioned to take full advantage of Zigbee.

Operators too have much to gain from the creation of new services and increased traffic resulting from the billions of new networked devices.