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# UWB's dream is still alive in micro-location

UltraWideBand didn't die in the WiMedia fiasco, may have valuable IoT roles in positioning and body area networks

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Good technologies often fall foul of the politics of the standards process, but a prime example, UltraWideBand, has reappeared, addressing micro-location issues in the internet of things (IoT).

Ireland-based company Decawave is using UWB to offer extremely granular location data, often indoors. It has implemented the short-range, ultra-low power technology with extremely small signal range, claiming accuracy between 10 and 30 centimeters, and says this will have broad applications in the automotive and industrial segments, where it already has customers.

There are rivals in this space, of course, including Bluetooth Low Energy (BLE) and humble RFID. UWB can support higher data rates than these technologies - a decade ago, it was envisaged as a standard for short range home media networks or wireless USB - but many tracking applications requiring micro-location do not need superfast transmission.

And UWB has suffered from a long period when the industry largely lost interest in it. This means it has not received the R&D effort and funding of BLE, WiFi or even RFID; it has not been incorporated into mainstream devices and SoCs; and consequently there is still work to reduce the size and cost of the silicon.

Nonetheless, the IoT will be a place of many applications and requirements, and there may be room for UWB in specialized areas, even if the 'great UltraWideBand wars' of 2005 are a distant memory. Then, the once hotly tipped radio technology fell casualty to vendor and carrier politics, technical compromises and disappointing performance. It was being pushed as a standard for wireless personal area networking (WPAN), but a war broke out between camps led respectively by Freescale, and by Intel/Texas Instruments.

As technical and commercial problems spoiled the UWB dream, the majors pulled away and WPAN standards shifted towards more conventional approaches like Wi-Fi. But UWB has retained a presence in military and security markets, where its location awareness is prized and the issues of cost and standardization are less important. Now, some of the surviving start-ups will hope to target commercial markets once again.

In 2012, Decawave raised €6m ($7.9m) in a second round of financing, and appointed Jim O'Hara - a former Intel VP, and leading light in that firm's brief love affair with UWB - as its chairman. Decawave's CEO is Ciaran Connell, who formerly worked at Freescale and Motorola, which were ranged against Intel in the UWB battle.

Two years later, the company has brought its UWB technology for real time location systems (RTLS) and wireless sensor networks out into the sunlight. Its chip, called Scensor, is based on the IEEE 802.15.4a standard, supporting data rates of 110Kbps, 850Kbps, 6.8Mbps and 27Mbps according to distance and frequency.

The company sampled devices in 2009 but says the applications are now opening up to achieve a commercial headwind.

The chances for UWB in high speed personal area connectivity, a field now clearly usurped by gigabit Wi-Fi, are over. With an eye on that market, and the 'WiMedia' standard, Intel and TI led the effort to implement UWB with OFDM techniques to boost its suitability for high data rates and loads, but this compromised on its spectral flexibility and other hallmarks.

Now the UWB focus is firmly back on applications which prioritize ultra-low power rather than high data rates - the industrial control segment inhabited by the IEEE 802.15 family of standards, such as ZigBee. These are gaining new profile as niche machine control applications morph into the burgeoning M2M space, where increasingly tiny embedded devices, such as sensors, have to exchange rising amounts of data.

DecaWave co-founder and CTO, Michael McLaughlin, was a contributor to the IEEE 802.15.4a standard, and the new firm has a strong play for sensor networking. UWB has retained a role in 802.15.4 since the 4a extension added two additional PHY (physical layer) options to the original four, one of them being UWB, in three ranges (sub-1GHz, 3GHz to 5GHz, and 6GHz to 10GHz).

And the 802.15.6 standard for body area networks is also emerging, promising the same range and speed as Bluetooth but with lower power consumption and interference potential. It works in a similar way to NFC, and sets up connections at 21MHz or 32MHz to transmit data at speeds from 164Kbps to 1.3Mbps, over three meters, targeting applications such as health monitors.

The standard defines a MAC layer that supports several PHY layers - UWB, a development led by Japan's National Institute of Information and Communications Technology; Narrowband, led by Samsung and focused on device connectivity around humans; and Human Body Communications (HBC), led by the MedWin Alliance, specifically for medical gadgets.