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# SIGNature

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## Ten-Year Checkup

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## Less Is More

*Industry and Bluetooth SIG experts examine the use of Bluetooth technology in medicine, where fewer cables go along with more flexible and friendly care. Our participants also spotlight the new ultra low power Bluetooth technology that enables the use of devices with small batteries for medical, industrial and other applications.*



### Prescription for Success An Interview with Robert Hughes

Imagine you're on an international business trip. You start the day with a 30-minute jog in the hotel gym. You wear a *Bluetooth* enabled heart rate monitor that transmits data to your cell phone, which then forwards the information to your fitness coach back in your hometown. After you cool down, you use a *Bluetooth* enabled blood pressure monitor to send a reading to your doctor. When you return home, you log on to your PC where you can track your progress.

Sound simple? Actually, it's not. The technology is certainly available to do such things; the problem is that international standards had not been developed to enable the economical wireless transmission of personal health data.

Addressing that situation is the role of the *Bluetooth* Medical Devices Working Group. Established in May 2006, the group includes 35 member companies of the Bluetooth SIG, including consumer-product heavyweights Intel, IBM and Motorola, along with medical device makers such as Nonin Medical, Roche Diagnostics, A&D Medical and Welch Allyn.

"Our primary goal is to create standards that facilitate interoperability of *Bluetooth* enabled devices in the medical, health and fitness domains," explains Robert Hughes, chairman of the Working Group. "There aren't standards in this area today. Up to now, companies have generally used the Serial Port Profile with proprietary data formats, and they have been longing for standards to improve interoperability and reduce engineering and development costs."

Achieving standardized interoperability started with development of the Medical Device Profile (MDP) and underlying Multi-Channel Adaptation Protocol (MCAP), which will ensure interoperability among *Bluetooth* enabled health and fitness devices. Prototype specs became available to Bluetooth SIG members last year and formal interoperability testing was completed in November.

The group also teamed with the IEEE and others to form the IEEE 11073 Personal Health Data Working Group. That group is working to finalize the ISO/IEEE P11073-20601™ Data Exchange Protocol in addition to a series of specifications that define an internationally accepted data format for consumer health devices. These data standards are designed to be transport-independent. At publication, Hughes expected both the MDP and MCAP to be adopted by the end of the first quarter of 2008.

The other piece of the puzzle is the ultra low power technology being worked into the *Bluetooth* wireless specification. Hughes expects the group to have extensions defined later this year to enable ultra low power health applications.

The result could transform the home health and fitness sectors, which are full of devices that can be made *Bluetooth* enabled. "The data these devices collect can be automatically aggregated and shared with a remote caregiver," Hughes notes, "whether that be a doctor, a fitness coach or a family member."

The business opportunities are tremendous, given the widespread availability of *Bluetooth* technology. "With large industry organizations such as the Continua Health Alliance and other momentum from health care providers, governments and gyms, there is a potential for millions of these devices to hit the market by

2009 with ultra low power devices to follow," Hughes envisions. "If payers recognize the potential these devices have to reduce the cost of health care, there is a good chance they'll start to reimburse for them." At least one government-run health care system is already exploring such opportunities.

Most significant is the meaningful difference the technology could make in people's lives. According to the World Health Organization, hundreds of millions of people have chronic diseases such as hypertension, asthma, diabetes and heart disease – exactly the kinds of conditions that *Bluetooth* enabled medical devices could monitor cost-effectively. ❸

**Robert Hughes** is senior wireless standards architect for Intel's Digital Health Group and chairman of the Bluetooth Medical Devices Working Group. He spoke with **Eric Schoeniger**, a writer specializing in business and technology.



### **A New Integration**

**By Nick Hunn, as told by Logan Kugler**

Until now, *Bluetooth* technology hasn't been able to address markets with low-power requirements – that is, devices that run off long-life button-cell batteries. The introduction of ultra low power *Bluetooth* technology to the *Bluetooth* core specification changes that by enabling things like watches, remote controls (such as electronic car keys) and sensors that can communicate with mobile phones, PCs and a host of other devices.

Traditional *Bluetooth* technology enables applications where you've got a regular stream of data (think headsets and computer keyboards), which typically require either a decent-sized battery or one that's frequently recharged.

Ultra low power, on the other hand, is ideal for applications that transfer small amounts of data, such as sensors, thermostats, medical and fitness devices and other products where you either can't or don't want to change the battery often (or at all).

Because ultra low power *Bluetooth* wireless technology is being integrated into the new *Bluetooth* core specification, products qualified to that spec will automatically have ultra low power capabilities. This extension, along with the new secure, simple pairing feature, will transform how we use *Bluetooth* technology.

For example, your mobile phone can act as a gateway for data from other devices. Say I buy a *Bluetooth* enabled blood pressure meter. I can take it out of the box and immediately pair it with my mobile phone. From that point, every time I use that blood pressure meter it can send my information to my phone, from which it can be automatically forwarded to my health provider.

What ultra low power does is allow more devices to be intelligently measured and controlled. The first generation of connectivity was PCs and the second generation was mobile phones. The third generation will be all of those machines that sit around us in our everyday life but so far haven't really connected to anything.

***"Ultra low power Bluetooth technology will enable a whole new range of consumer and industrial devices that haven't been connectible in the past." – Nick Hunn, Ezurio Ltd.***



I think we're going to start seeing chip companies adding an additional microprocessor onto *Bluetooth* wireless chips so that a single chip can handle the wireless communication as well as drive the actual functionality of the device. In some cases they're already close to doing that. It means it will become easier and less expensive to manufacture these products, which will enable consumer-to-machine and business-to-machine connectivity like never before. It's why so many people are looking at Machine to Machine or M2M as the next great growth opportunity.

Members of the Bluetooth SIG should be seriously thinking about how the technology can enhance their current and future products. Ultra low power *Bluetooth* technology will enable a whole new range of consumer and industrial devices that haven't been connectible in the past. What manufacturers really need to ask is this: What would my product do if it could be connected – if it didn't live in isolation? How much more value could it offer to the user?

That, I think, is the real benefit of ultra low power *Bluetooth* technology: allowing devices to connect that previously could not. And once you've connected something, you can start to look at the intelligence it offers and the value of that intelligence to the consumer.

Ultimately, this phase of *Bluetooth* technology's evolution brings Web 2.0 to machines, whether medical, consumer or industrial. It takes us into the data age – a critical step in achieving a true information age. ☺

*Nick Hunn is chief technology officer for Ezurio Ltd., a U.K.-based supplier of Bluetooth wireless technology, 802.11 and embedded wireless modules. Nick is also an executive director of the Mobile Data Association.*



**High on Ultra Low Power**  
**An Interview with Ben Wood**

Bigger and better? Not so interesting. Smaller, more efficient and less expensive? Now you're talking. With ultra low power *Bluetooth* technology merged into the *Bluetooth* core specification and with adoption rates ever increasing, prices are falling as dramatically as power consumption. What once cost an estimated \$3 per electronic device can now be had for less than half that.

You can expect an explosion of new *Bluetooth* enabled consumer devices in the near future as a result. "You could call this a watershed moment in the history of *Bluetooth*," says Ben Wood of CCS Insight, a U.K.-based firm providing market information, analysis and intelligence for companies in the telecommunications and IT sectors. "It's truly exciting."

Wood already wears a watch linked to his mobile phone via *Bluetooth* technology. When an incoming call or a text message arrives, the watch vibrates. Its display shows Wood the caller's ID; he can then touch a button on the watch to reject or mute the call, or accept it by pressing the answer key on the phone. The watch can also control the MP3 player in his phone.

With consumer demand up and power consumption and prices down, Wood expects the range of low-power and sensor applications to increase.

He anticipates the first major wave of new ultra low power *Bluetooth* enabled products to appear by the second half of 2009, with mass shipments in 2010.

"You are really looking at a technology that will work with very small amounts of power, so it will transition, for example, from cell phones into watches, games, sports equipment and health care sensors," Wood says.

Health care, in particular, is an industry worth watching. "I think this is an area where there is a huge opportunity," says Wood. People with chronic conditions like cardiovascular disease or diabetes, for example, can keep a closer eye on their condition – and keep their doctors informed – with *Bluetooth* enabled medical monitoring devices. Caregivers could even use pill containers that remind patients to take their next dose on time.

Wood envisions a range of other applications, some of which are already in development:

- Compact pulse monitors, pedometers and other fitness sensors or displays
- A new wave of interactive wireless toys and entertainment devices
- Home security and maintenance devices and sensors for controlling lights, locks and HVAC systems
- Automotive telemetry, with tiny sensors that monitor tire pressure and engine systems and send alerts of imminent problems, and increasingly sophisticated onboard entertainment and communications systems
- Identification verification systems

As the *Bluetooth* wireless chips continue to come down in price and consume less power, Wood says, "you can see their uses are only limited by your imagination. It's exciting, especially when you think about how pervasive the cell phone has become in society. We have some 3 billion people using cell phones now, and because of that, wireless technology has become very much accepted – and people expect it to do more. (With) ultra low power *Bluetooth* technology could (even) breathe new life into the watch market." ☺

*Ben Wood, research director for CCS Insight, is quoted in publications such as The Wall Street Journal and Financial Times. He spoke with Pat Pawling, who writes technical articles for clients such as Cisco Systems and Xerox.*



**Making the Medical Case**  
**By Jayant Parthasarathy, Ph.D.**

Wireless technology is ubiquitous in clinical settings today. Paramedics leap from ambulances clutching wireless sensors, premature babies receive soothing "kangaroo care" minus the irritating wires, adult hospital patients have freedom to move about and operating rooms have gone high-tech with wireless telemetry.

A second wave of wireless innovation in health care began with the announcement late last year of the *Bluetooth* Medical Device Profile. I was privileged to serve then as co-chair of the Medical Devices Working Group.

The profile clears a path to seamless interoperability never seen before in medical applications. Now it's possible for inconspicuous wireless sensors