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for the short
range connectivity
environment

Video enabled  Issue 114

October 2007



BLUETOOTH EVOLUTION – OPPORTUNITIES AND CHALLENGES

THIS ISSUE

LOOK! NO HANDS - AND NO SOFTWARE!
DOES ZIGBEE HAVE THE X-FACTOR?
OLD WIRELESS STANDARDS NEVER DIE

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in celebration of things that just work – part 2

Regular readers may remember that last month I celebrated my new car's integrated Bluetooth hands-free system. And the fact that it just works. Or it did. Now, my phone still synchs when I get in the car, and if someone calls me, it all works fine.

But, if I try to call out, it doesn't work. Calls apparently connect, but I can't hear anything from the other end, and they can't hear me. This is really annoying, and must drive my friends and family mad as I try to talk to them.

And isn't it time we all owned up to the fact that this still happens a lot with Bluetooth? As you can probably imagine, an awful lot of Bluetooth equipment passes through Incisor's door. We get privileged access to a lot of new products, many of which are latest generation, theoretically state of the art products. But, we spend far too much time trying to work out why something that has paired properly, and which was working fine, now isn't.

Excepting the odd moment of complete stupidity, we've generally got a reasonably good idea how to make Bluetooth equipment work properly. The fact that it regularly doesn't do so is worrying. Incisor is loyal to Bluetooth, and has exercised a policy of not being too hard on early products that played up. But the market is maturing now. Over the last nine years the Bluetooth SIG has dedicated a huge amount of time and effort to ensuring interoperability and the quality of the used experience. Things should work properly, and if they don't, the manufacturers should face up to it.

If we are having problems, think how consumers must be getting on.

Vince Holton

Publisher & editor-in-chief, Incisor

INCISOR IS PLEASED TO WELCOME...

Dr Dean Anthony Gratton as an editorial contributor. Dean is the co-founder of whatiswireless.co.uk and the author of several patents and a number of best-selling books. His latest book, *Developing Practical Wireless Applications* (Digital Press, an imprint of Elsevier) has been critically acclaimed with Barnes & Noble describing it as "like hiring a really well-connected industry expert – for, say, one percent of the cost." Dean has worked within the telecommunications industry for over ten years and provides consultancy to a number of high profile companies.

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New Chief Exec for CSR

On the 25 September 2007, CSR surprised many in the wireless industry by announcing that Joep van Beurden, currently Chief Executive Officer of NexWave Inc, would join the Board of CSR and assume the role of Chief Executive Officer with effect from the 1 November, 2007. Current CEO John Scarisbrick is to step down from the Board of CSR and his role as Chief Executive Officer on the 1 November 2007. He will act in an advisory capacity to CSR from that date until the 31 December 2007.

CSR's chairman Ron Mackintosh commented "John has made a substantial contribution to CSR, first as a non-executive director since 2004 and then as Chief Executive Officer since March 2006. Over that period, CSR has achieved impressive growth, developed its business on all fronts and clearly reinforced its position as the global leader in our sector. As our recent financials and third quarter guidance demonstrate, John is leaving CSR in robust shape and well positioned for the next phase of its development.

Mackintosh continued "The Board undertook an in-depth selection process and is delighted to announce Joep as our new Chief Executive. In his career, Joep has more than demonstrated his strong strategic vision, proven leadership abilities and energy. His mix of skills and experience, including in the scaling of technology businesses and in sales and marketing, suit him ideally to the opportunities facing CSR as our wireless technologies evolve both within and increasingly beyond the mobile marketplace. We are confident in the future of CSR under Joep's leadership."

Joep, age 47, is currently the Chief Executive of NexWave Inc., a provider of embedded software solutions for the consumer electronics market, based in France. Prior to joining NexWave, Joep held senior positions at Canesta Inc., a fabless semiconductor company, and Philips Components, where he was involved in the creation of the successful joint venture with LGE to address the growing flat panel television market. Prior to that, Joep worked for five years at McKinsey & Company in Amsterdam. Joep is married with four children and he and his family are relocating from their current home in France to Cambridge, UK.

John Scarisbrick, said: 'I have enjoyed my time with CSR and am very proud of its accomplishments as the leading global provider of personal wireless technology. CSR continues to show strong growth; it has an exceptional and exceptionally talented team; and the opportunities for wirefree connectivity continue to expand. In Joep, CSR has found the right person to succeed me and I wish him and CSR all the very greatest of continued success, which I am confident both will enjoy.'

Although CSR's share price is taking a bit of a bashing at the moment, the company's overall performance remains very impressive. On 25 July, CSR reported record revenues and operating cash flow for the first half of 2007, and was able to report that design-in and design-win momentum remained strong across all applications. CSR says it will report third quarter revenues in line with the previous guidance of \$230-250 million.

Bluetooth SIG considers 802.11 as an Alternate MAC/PHY

Although efforts have been made to make sure that Bluetooth and Wi-Fi co-exist happily, there is still some sense of a distance and competitive element to the relationship between the two technologies. Low-level noise has been made – primarily by the Bluetooth SIG – about potential closer ties. There are further indications that this situation may be coming closer. According to a recent statement from the Bluetooth SIG, the 802.11 Core Feature Requirements Document (FRD) and updated Core Specification Working Group Charter submitted by the 802.11 Study Group have been approved by the Bluetooth SIG Board of Directors.

The 802.11 Core FRD defines the functional requirements for enhancing the existing Bluetooth Core Specification to enable Bluetooth Profiles to operate over an 802.11 MAC/PHY. The utilization of 802.11 as an alternate MAC/PHY would offer users higher data rates and result in the enhancement of many existing Bluetooth technology use cases such as printing, file transfer, synching and video sharing.

With the approval of these documents, the SIG will apparently now dissolve its 802.11 Study Group and members participating in this study group have been advised to apply to join the Core Specification Working Group to continue working on this project.

This is an interesting topic, and Incisor has been discussing a future feature with the SIG execs. We hope to publish this for our readers soon.

Watch this space!



Broadcom puts Bluetooth in set-top box

Broadcom is combining its Bluetooth solutions with its digital cable and satellite television set-top box (STB) technologies, saying that driving Bluetooth wireless into set-top boxes will significantly expand traditional STB functionality and make these systems compatible with the growing number of Bluetooth remote control, audio and handset devices.

With over 90 million set-top boxes sold worldwide every year, Broadcom believes that the addition of Bluetooth functionality in these devices will enable STB makers to offer differentiated features in their products.

"Bluetooth makes sense as it solves the immediate need of providing home phone line connectivity, and allows audio and remote control use without the need for line-of-sight infrared (IR) technology," said Jim Muth, Senior Product Line Manager of Broadcom's Wireless Personal Area Networking line of business. "In addition, Bluetooth opens up a whole new world of innovative and exciting applications by enabling set-top boxes to have connectivity to the hundreds of millions of Bluetooth devices that are sold each year."

Broadcom highlighted some of the benefits resulting from the integration of Bluetooth in set-top boxes:

- Enables a cellular network to be used for ordering or recovering orders for pay per view or other services when a land line is not present or not conveniently located near a STB.
- Allows channel changes with the entertainment cabinet door closed, eliminating the need for line-of-sight IR technology.
- Enables wireless headsets and wireless speakers.
- Enables more powerful remote controls such as:
 - Whole house remotes with two-way services
 - Sound, vibration and motion sensing controllers

- User-friendly remotes with displays
- Enables cell phone downloads of pictures for storage or display.
- Enables Bluetooth connections from STBs to landline phone jacks.
- Enables Bluetooth mouse and keyboard connections.
- Enables Bluetooth connections of cell phones, laptops and PDAs to STBs and provides synchronization of calendars, meetings, etc.

Broadcom's new Bluetooth and set-top box reference design is based on the company's high definition (HD) MPEG-4 reference platforms. It utilizes the BCM740x series of HD MPEG-4 devices in conjunction with Broadcom's BCM2046 Bluetooth solution.

... and joins LiMo

Heard of LiMo? Perhaps not. The LiMo Foundation was established earlier this year by Motorola, NEC, NTT DoCoMo, Panasonic Mobile Communications, Samsung Electronics, and Vodafone with the aim of creating the world's first Linux-based software platform for mobile devices. Target benefits for the mobile industry include lower development costs, increased flexibility, and an active mobile ecosystem surrounding the platform. LiMo says it is encouraging the creation of compelling, differentiated and enhanced consumer experiences.

Although LiMo is only a few months old, it is grabbing some attention. Broadcom, for example, has joined the LiMo Foundation as one of its first semiconductor suppliers.

Broadcom believes that as 3G solutions continue to evolve, next generation handsets will require a software platform that can keep pace with this increasing level of sophistication. Broadcom is of the view that the Linux operating system is continuing to gain momentum in the mobile space, and so it will work with the LiMo Foundation to address industry concerns such as power, size and cost, in an effort to achieve widespread adoption of Linux-based handsets.

"Broadcom's membership in the LiMo Foundation highlights the growing enthusiasm for mobile Linux and the effort to build products within a shared architecture," said Morgan Gilis, Executive Director of the LiMo Foundation. "The power of the LiMo Foundation increases with each new committed contributor and the addition of Broadcom to this alliance will make the technology increasingly attractive for new handset products."

Broadcom expects its initial Linux-compliant mobile solutions to include the BCM2153 and BCM2820. Both are currently available to Broadcom's strategic partners. Broadcom also makes available complete development platforms, pre-integrated with associated software and peripheral devices, such as PMU, Bluetooth, Wi-Fi, FM Radio, and GPS.

connectBlue simplifies programming

Swedish company connectBlue is setting out to increase efficiency in wireless application programming for industrial needs. It has launched a new USB Serial Port Adapter with Bluetooth and Wireless LAN (WLAN) functionality. connectBlue claims that this makes configuration and testing easier for the industrial application programmer as it eliminates the need for cables for connection as well as for power supply.

The adapter automatically installs itself as a virtual COM port when connected to the computer. The programmer uses connectBlue standard AT commands. The Bluetooth and WLAN stacks are incorporated in the connectBlue modules, so no additional software is needed in the computer.

Besides the Serial Port Adapter firmware, the USB adapter can be equipped with other firmware versions such as support for the Bluetooth File Transfer (FTP) and Object Push (OPP) profiles, Bluetooth I/O, repeater functionality and multi-point versions.



PTS sets industry example, says SIG

The Bluetooth SIG has been talking about the Profile Tuning Suite (PTS) of late. This was created by the Bluetooth SIG and introduced last year. For those not familiar with it, the PTS is a tool that automates Bluetooth profile testing. The SIG's aim was to reduce the cost and time associated with qualification and to improve Bluetooth device interoperability at the application level.

The PTS runs on a personal computer and can simulate any Bluetooth device or profile. SIG member companies can use it to test new devices with a wide variety of existing applications to improve interoperability. Samsung qualifies more Bluetooth devices than any other company in the world with 114 listings so far in 2007, and Pete Skarzynski, senior vice president of Samsung Telecommunications America spoke up in support of the PTS: "Time is money, especially in the wireless industry. The PTS tool from the Bluetooth SIG helps us to decrease qualification time of our Bluetooth devices while increasing quality."

Mike Foley, executive director of the Bluetooth SIG added his own thoughts: "The PTS is unique to the industry and will continue to play an important role in the accelerated growth of Bluetooth technology. It is also one of many SIG programs that enticed other wireless organizations like the WiMedia Alliance and Wibree Forum to work with the Bluetooth SIG to bring high speed and ultra low power Bluetooth technology to market."

The PTS is free of charge for promoter and associate members.

Wipro-NewLogic repeats success in Bluetooth and WLAN IP

Wipro-NewLogic, the semiconductor IP business unit of Wipro Technologies, was ranked as the #1 supplier of Wireless LAN and Bluetooth IP worldwide according to Gartner, Inc.'s recently published 2006 Semiconductor IP Survey.

Wipro-NewLogic has something of a track record here. It was number one in both sectors in 2004, and number one in Wireless LAN in 2005. Wipro-NewLogic's 61% Wireless LAN market share is more than three times that of its nearest competitor. Gartner also rates Wipro-NewLogic as the number one worldwide supplier of Bluetooth based on Design IP revenue commanding 59% market share in 2006.

"We are excited that Gartner has recognized us again as the world leader in WLAN and Bluetooth IPs this year and this is a reinforcement of our leadership in this area. Our BT 2.0 + EDR IP which is software upgradeable to Bluetooth 2.1 + EDR has passed official testing for BT 2.0 + EDR qualification", said Mana Coste, Director Marketing at Wipro-NewLogic. "We have been seeing good momentum for these two mature wireless technologies, including several wins with customers who asked us to design a complete turnkey solution around the IPs, especially low power ICs. Several of these complete SoCs included the RF on the same die."

Coste continued: "One trend in wireless IP integration is combo solutions where different wireless technologies co-exist in the same device – especially useful in laptops and smartphones. We are seeing a lot of demand for combo solutions such as Bluetooth and WLAN, WLAN and WiMAX, WiMAX and Bluetooth and Bluetooth over UWB."

Wipro-NewLogic's wireless LAN IP offering comprises of an IEEE 802.11 a/b/g MAC (hardware+software), modem (baseband) and radio (RF). It includes support for the latest Wi-Fi specifications like WPA2 and WMM.

The Bluetooth portfolio consists of the Bluetooth baseband core, a full Bluetooth software protocol stack, and a Bluetooth CMOS RF transceiver. It supports the Bluetooth 2.0 + EDR specification, and will be compatible with Bluetooth 2.1 + EDR with a software upgrade.

GPS ready to invade other markets

Until now GPS market growth has been limited mainly to PNDs (Personal Navigation Devices) and mobile phones. IMS Research forecasts that in 2008 GPS market growth will be felt in other markets beyond PNDs, where a number of product announcements are expected in markets such as Digital Cameras, Laptops and PMPs (Personal Media Players).

IMS Research believes that these three vertical markets will grow strongly in the following years, with the population of GPS-enabled devices jumping from below the level of a million area in 2006 to 80 million units shipped in 2010, with penetration rates in some of these markets much higher than in cellular. It has published a report "The Worldwide Market for GNSS/GPS-enabled Portable Devices", which examines GPS penetration, in each individual portable market, over the next five years.

Matia Grossi, author of the report, says "PNDs have raised consumer awareness for the capabilities of GPS, which has given rise to the integration of GPS in other markets. We will begin to see consumers with digital cameras, PMPs and laptops that have GPS."

THE *BLUETOOTH*[®] EVOLUTION CONFERENCE

31ST OCTOBER - 2ND NOVEMBER, 2007

LONDON

IMS Conferences and the Bluetooth SIG will jointly host the 2007 *Bluetooth*[®] Evolution Conference and Workshop in London, between October 31st and November 2nd, 2007.

This unique international event will examine the commercial and technical impact that ultra low power *Bluetooth* (formerly WiBree) technology and high speed *Bluetooth* technology will have on the wireless marketplace. The conference will address a wide variety of topics including:

DAY ONE - HIGH SPEED *BLUETOOTH*[®] TECHNOLOGY

High Speed *Bluetooth* Technology - What are the Next Steps to Ensure Success?

What are the Innovative Applications for High Speed *Bluetooth* Technology?

How do we Turn These New Ideas into Marketable Products?

Bluetooth and UWB Coexistence in Cellular – Lessons Learned and Pitfalls to Avoid

Will High Speed Help Drive *Bluetooth* Penetration Rates in PCs & Printers?

Market Predictions - Where Are we Now and Where are we Headed?

DAY TWO - ULTRA LOW POWER *BLUETOOTH*[®] TECHNOLOGY

Where Does Ultra Low Power *Bluetooth* Technology Fit in the *Bluetooth* Landscape?

What will be the Architecture and Trade-Offs for Dual Mode *Bluetooth* ICs?

Interoperability – Bringing a New Dimension to Ultra Low Power Wireless Connectivity

Applying Ultra Low Power *Bluetooth* Technology for Gathering, Storing & Processing Information

Can Ultra Low Power *Bluetooth* Technology Displace Proprietary Toy & Game Solutions?

Comparing the Use of *Bluetooth* and Zigbee in Automation Applications

DAY THREE - ULTRA LOW POWER *BLUETOOTH*[®] TECHNOLOGY TRAINING WORKSHOP

A supplementary ultra low power *Bluetooth* technology training workshop from the Bluetooth SIG.

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CSR adds silicon-level speech recognition technology

CSR has expanded its portfolio of software enhancements for the BlueCore5-Multimedia platform. With the recent addition of Sensory's speech recognition software, its customers will be able to integrate speech control and command functions to Bluetooth mono and stereo headsets and hands-free car kits.

Sensory's FluentSoft is the first speech recognition software to be integrated into CSR's BlueCore5-Multimedia silicon. Suggested applications for voice-activation, many of which are described as not practical or user friendly with button pushes, include call control and dialling, battery level and connection checks, pairing, audio settings adjustment, and playback and control of music.

Sensory's SX speech synthesis is also included, enabling real time voice prompts and confirmations, answers to status queries such as battery check, and help guidance on device operations such as pairing.

Sensory's claim that FluentSoft is speaker independent with no end user training necessary seemed hard to believe, but Incisor had an opportunity to try it out at a meeting in London with Sensory's CEO Todd Mozer. There were a couple of glitches resulting from the fact that we were in a very noisy, outdoor environment, but otherwise the prototype headset gave the right responses to the right prompts, apparently having no difficulty understanding a British accent!

Sensory does in fact support all primary world languages, and OEMs can customise the user interface, command vocabulary, and voice prompts to create a unique, differentiated experience for their customers.

Commenting on the deal with CSR, Mozer told Incisor, "Without speech recognition, product designers have been constrained in form factor, features, and user interface. Our FluentSoft Bluetooth Suite ported to the popular BlueCore5-Multimedia unleashes designers' creativity to add custom features, and deliver a user experience that was not possible before."

Back in Cambridge, Anthony Murray, Senior Vice President of CSR's Wireless Audio Strategic Business Unit added his thoughts, "Bluetooth mono and stereo headsets are decreasing in size, and speech recognition overcomes the challenges faced by a more limited user interface. Having Sensory as a CSR eXtension Partner is also good news for the automotive market, as we can now provide a single-chip solution with Bluetooth technology and speech recognition, considerably reducing manufacturing costs of hands-free car kits and embedded Bluetooth designs."

QuickLogic looks to high speed UART for Bluetooth

QuickLogic Corporation, has launched a new UART (universal asynchronous receiver/transmitter) proven system block for use with its Customer Specific Standard Product (CSSP) platforms. The core supports the full 3Mbps/second data rates required for compatibility with the Bluetooth 2.1 + EDR (Enhanced Data Rate) specification, and may be configured with other proven functions to provide a low-power, single-chip connectivity solution. QuickLogic's backbone business is providing low power programmable solutions for the portable electronics, industrial, communications and military markets

UARTs have been used as a general-purpose serial communications function for

decades, but are typically designed for low data-rate applications such as a PC serial port. More recently, UARTs have become the most common form of host controller interface for Bluetooth communications. With the advent of the latest versions of the Bluetooth specification and the EDR transfer mode for high-speed streaming, the UARTs traditionally used in mobile application processors are proving to be too slow. QuickLogic believes that the new UART system block offers the level of performance that Bluetooth 2.1 + EDR requires.

"QuickLogic's high-speed UART solution allows portable device OEMs and ODMs to quickly implement Bluetooth 2.1 capability - without waiting for application processor vendors to upgrade their embedded UARTs to the required performance," says Howard Li, QuickLogic's Senior Platform Solution Marketing Manager. "Together with the flexibility of QuickLogic's CSSP platform approach, this solution allows designers to gain a competitive advantage and create product differentiation - today."

The high-speed UART solution is available immediately as part of QuickLogic's CSSP system block library.

Fistfull of chips

The Broadcom/Qualcomm spat previously reported in Incisor rumbles on in the US. The ITC had banned import of new handset models containing Qualcomm chips found to infringe Broadcom's patents. Now, though, a Federal appeal court judge has put this ban on hold, following an appeal by the handset manufacturers and carriers that the decision be reversed.

Understandably, Qualcomm is rather pleased, while Broadcom is trying to maintain a Clint Eastwood stare, and is quietly predicting that the ban will be reinstated.

new products



Rohde & Schwarz adds to spectrum analyser range

Rohde & Schwarz has launched the FSG, a spectrum analyser that it says is aimed at cost-conscious users. The R&S FSG supports all the standards of the 2nd and 3rd mobile radio generation as well as current broadband technologies such as WiMAX, and R&S suggests that its high dynamic range, a frequency range up to 13.6 GHz, and the integrated vector signal analysis make the FSG a powerful tool for the general analysis of digitally modulated signals.

The R&S FSG spectrum analyser is suitable for a wide range of applications, e.g. in development labs, production lines, and as a reference for product verifications. Measurement applications for internationally common standards such as GSM, WCDMA, CDMA2000 1xRTT, TD-SCDMA, HSPA, Bluetooth, WLAN or WiMAX are available. Other features include an I/Q demodulation bandwidth of 28 MHz, a high dynamic range of, for example, 170 dB between 1 dB compression point and DANL, as well as integrated vector signal analysis. The customized operating concept of the Rohde & Schwarz spectrum and signal analysers also supports the user in the development of new mobile radio products.

The R&S FSG is available in the frequency ranges up to 8 GHz and 13.6 GHz. The spectrum analyser provides GPIB, LAN (10/100BaseT), and USB 2.0 interfaces and is also compatible with the LXI Class C. For highly accurate determination of absolute signal powers, the R&S NRP power sensors can also be directly connected to the instrument.

The R&S FSG spectrum analyser is available now from Rohde & Schwarz.



Nokia embraces convergence

Nokia is taking steps to establish itself in the convergence market. Its new 6301 phone offers consumers voice and data mobility across GSM cellular and WLAN networks via Unlicensed Mobile Access (UMA) technology. The 6301 phone uses UMA to integrate the benefits of landline and a mobile phone, including what Nokia says is seamless indoor coverage, sound quality and affordability.

With UMA technology, the consumer can use the GSM network or a broadband Internet-connected WLAN network for mobile services. The consumer can have one multi-mode handset that works everywhere with enhanced voice services.

"The convergence of mobile and fixed/land-line technologies means consumers are looking for products that can help make their lives easier," said Peter Ropke, Senior Vice President, Mobile Phones, Nokia. "With the Nokia 6301 utilising UMA technology, worldwide tri-band GSM coverage is combined with superior indoor WLAN coverage to create a device that people can use in virtually any situation."

Nokia also notes that with UMA technology, the 6301 benefits operators as well, suggesting that they can deliver voice and data services to subscribers over WLAN, increasing mobile service availability while decreasing the costs related to network deployment. Orange will be one of the first operators to offer the Nokia 6301, as part of its Unik/Unique portfolio.

The Nokia 6301 also has a 2 megapixel camera with 8x digital zoom and full screen viewfinder, and integrated hands-free speaker and a desk stand to hold the phone and keep its battery charged while connected to WLAN. No mention of Bluetooth though.



The Nokia 6301 is expected to begin shipping to select markets in Europe during the fourth quarter of 2007 with an estimated retail price of 230 euros before subsidies or taxes.

Wi-Fi and Bluetooth in Mio GPS PDA phone

CSR's UniFi-1 Portable for Wi-Fi and BlueCore4-ROM for Bluetooth have been selected by Mio Technology for its new DigiWalker A702 quad band GPS PDA Phone, which was recently awarded China's IF (International Forum) design prize.

CSR's UniFi-1-Portable supports IEEE802.11b/g and a standby current of <10 mW, while the BlueCore4-ROM hardware plus BlueCore Host Software is a complete and fully-integrated Bluetooth hardware and software solution. For Mio's Windows Mobile PDA phone, CSR has incorporated Microsoft-OPP (Object Push Profile) for document or file transfer; plus CSR's Windows Profile Pack for Windows CE.

The Mio's A702 incorporates a 3.2Megapixel auto-focus camera with flash, and Windows Mobile 6 functionality.

CSR's Senior Vice President of Mobile Handset Connectivity Business Unit, Matthew Philips, commented, "Mio DigiWalker A702 is the perfect environment for combining CSR's UniFi and BlueCore technologies. Users of the handset will be able to simultaneously speak on a Bluetooth headset whilst accessing the internet on a Wi-Fi connection to make full use of the Mio's Windows Mobile 6 software. CSR's industry-leading power and coexistence means users will enjoy continuous interference-free operation."



Look! No hands — and no software!

by Helen Barnes, CSR



100 million users can't be wrong! And that's just the size of Skype's subscriber base alone. VoIP is certainly booming, and making calls over a PC-to-PC link is the starting point for most users. It's a similar story with internet radio: streaming via a PC is how most of us become familiar with the technology.

CSR now offers a plug'n'play Bluetooth dongle design for this application that allows users to use wireless headsets with the PC. It plugs into a PC via a USB socket and allows users to make VoIP calls, or listen to stereo music, streamed wirelessly to a Bluetooth mono or stereo headset, without installing any PC software. It is possible to switch seamlessly between listening to music and taking a VoIP call.

The Music'n'Voice or MV Dongle is a single-chip design, based on CSR's DSP- and codec-equipped BlueCore3-

Multimedia. It appears to the PC like a sound card, and can be used with all the major VoIP providers (Skype, MSN Messenger, GoogleTalk, Yahoo Messenger, etc), and popular music players such as iTunes, Windows Media Player, RealPlayer and WinAmp. The dongle will work with Windows 2000, XP and Vista.

Now that many mobile phones support the A2DP (Advanced Audio Distribution Profile), Bluetooth stereo headsets/headphones are becoming widely available, and this dongle is ideal for operation with these, and could easily be part of a bundled solution with headphones. The MV Dongle also operates with any mono Bluetooth headset for voice calls and music playback.

The example reference design has a very low bill of materials, because it is based on CSR's BlueCore3-Multimedia chip

with integrated DSP processor and high-quality CODEC. The solution consists of a BlueCore3 -Multimedia chip plus flash memory and very few external components. With such a low BOM, this design is ideally suited to cost-sensitive consumer electronics markets.

The reference design includes a button which can be used to connect back to a previously paired device, put the device into pairing mode, or to enable device firmware upgrade (DFU) for software updates. There are also two LEDs that can be easily configured to show the state of the dongle (these LED patterns can be changed by configuration options, without firmware modification).

The music is controlled via AVRCP (Audio/Video Remote Control Profile) commands from the headset, which are then issued as media player commands to the PC. AVRCP commands supported are Play, Pause, Stop, Skip Forward and Skip Backward. For voice, Hands Free Profile 1.5 commands are supported which are translated by the dongle into global hotkey codes that can be used to control the most popular VoIP applications. The MV Dongle will automatically pair with most Bluetooth headsets when it is plugged in (it supports the most common pin codes and can be configured for others) and will store a list of the five most recently paired devices for easy reconnection.

CSR's design for this application is a complete production-ready solution. The support package for developers includes the schematic, BOM, Gerber files and configurable software which can all be downloaded free of charge. The software has been fully interoperability tested with a wide range of headsets, so no extra development is required before going to market.

Helen Barnes is a Marketing Engineer at CSR.

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Enhanced Data Rate is Here!

Bluetooth evolution – opportunities and challenges

THE FUTURE OF BLUETOOTH TECHNOLOGY HAS BEEN ASSURED FOR A NUMBER OF YEARS NOW, SECURED BY ITS PREVALENCE IN HANDSETS AND DRIVEN BY THE MARKET FOR ENABLED HEADSETS. HOWEVER, THE LANDSCAPE IS CHANGING. OVER THE LAST 18 MONTHS, THE BLUETOOTH PORTFOLIO HAS EVOLVED FROM WHAT IS GENERALLY CONSIDERED “CORE BLUETOOTH TECHNOLOGY” TO INCLUDE A HIGH SPEED VERSION, AND AN ULTRA LOW POWER VERSION (FORMERLY WIBREE).

These changes are seen by many as revolutionary rather than evolutionary, and this is leading companies that supply Bluetooth ICs and end-equipment to re-evaluate their business models to ensure that their strategy is aligned with the opportunities presented by these new versions of Bluetooth technology.

For example, many new applications for

Bluetooth technology have emerged with the release of the high speed and low power variants, while further growth and cost optimisation can be achieved by utilising combination ICs, which combine Bluetooth with other wireless technologies in a single chip.

These dynamic changes have led the Conference Division of IMS Research to

organise two conferences that discuss and explore the challenges and opportunities presented by the evolving Bluetooth technology. The first of these, the “Bluetooth Evolution Conference”, will be hosted jointly with the Bluetooth SIG in London from 31st October to 2nd November, 2007. This international event will bring together senior industry executives from all parts of the value- →

chain together with over 30 speakers, to explore the commercial and technical impact of both high speed and low power Bluetooth technology. The keynote speeches, panel debates, networking sessions and case studies will be supplemented by a technical training workshop on low power Bluetooth technology.

Then, on 4th and 5th December 2007, the company will host the Wireless Coexistence Summit in San Jose, California. This event will focus on the latest trends in producing ICs that incorporate multiple wireless technologies. This will allow senior engineering and business managers from IC vendors and end-equipment manufacturers to take advantage of the highly interactive agenda to discuss the issues and opportunities that these combination ICs present. For full details and online registration for these events.

Bluetooth-Enabled Equipment Shipments to Hit 800 million this Year

IMS Research has tracked the market for Bluetooth technology since its inception, and has recently published the eighth edition of its annual Bluetooth report. In this new report, IMS continues to forecast healthy growth. However, caution should be exercised over the ultimate attach rates of Bluetooth technology in the total cellular handset market. As cellular handsets become more prevalent in less affluent markets, there is a growing demand for low-cost handsets that have only basic functionality. In this particular segment, it is probable that many handsets will not be enabled by Bluetooth technology, and hence the ultimate attach rate of 90% of all handsets globally, which suppliers initially anticipated, is unlikely to be attained.

Despite this, the Bluetooth wireless market has had another astounding year; worldwide Bluetooth-enabled end-equipment shipments are forecast to increase by over 40% from 2006 to 2007, to around 800 million units. Fiona Thomson, Senior Market Research Analyst with IMS Research commented, "This mainstream technology has continued to grab the headlines, despite other technologies such as GPS and WiMax demanding the attention of the wireless industry. With announcements such as an ultra low power version, Bluetooth technology is set to expand its reach and remain at the forefront of manufacturers minds."

The annual number of Bluetooth-enabled cellular handsets shipped is anticipated to surpass the 500 million unit mark for the first time ever in 2007. Meanwhile,

the market for mono headsets continues to thrive, and the market for stereo headsets, although it experienced a couple of false starts, is starting to show promise. The worldwide figures are still low for stereo headsets for a number of reasons including consumer acceptance, stereo headset design/price, and the fact that the other end of the equation (i.e. Bluetooth-enabled personal media players and A2DP-enabled phones) are yet to make a real impact on the market. Once the three of these happen, and IMS Research believes they will over the next 12 - 18 months, then we expect the stereo headset market to really take off. There is likely to be a big push at the end of 2007 and in 2008 but "considerable" worldwide volume won't be reached until 2009 and beyond.

After cellular handsets, the second largest application has historically been Bluetooth headsets. However, in 2007, gaming equipment has become the second largest application in terms of units shipped, with the Playstation 3, Xbox 360 and the Nintendo Wii all including Bluetooth (and Wi-Fi).

The IMS Research report entitled, "The Worldwide Market for Bluetooth - 2007" is available to Promoter and Associate members of the Bluetooth SIG for free. Adopter members are entitled to a 25% discount. For more information, please contact Fiona Thomson; Fiona.Thomson@IMSresearch.com



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– VERIZON WIRELESS

Chief Technology Office
– CONCRETE LOGIC

Distinguished Member of the
Technical Staff
– MOTOROLA

RF System Architect
– ARTIMI

Senior Engineer
– SAMSUNG ELECTRO-MECHANICS

Technical Director
– EUREX COMMUNICATIONS

Short Range W/less Lead Eng.
– FRACTUS

Senior Analyst
– STRATEGY ANALYTICS

Chief Application Engineer
– PHILIPS SEMICONDUCTOR

VP of Marketing & Business
Development
– ZIGBEE ALLIANCE

Design Engineer
– CSR

Business Dev. Manager
– TEXAS INSTRUMENTS

R & D Engineer
– HEWLETT PACKARD

Director, Seamless Mobility
– MOTOROLA

Procurement Manager
– BENQ

Systems Engineer
– DAIMLER CHRYSLER

Principal Design Engineer
– PANASONIC

Director, Product Development
– MOTOROLA

Research Engineer
– LG INNOTEK

Software Engineer
– DELPHI DELCO ELECT.

Corporate Strategic Planning
– LSI LOGIC

Fellow, Office of the Chief
Technology Officer
– LSI LOGIC

Equity Analyst
– HANDELSBANKEN

Senior Electrical Engineer
– MOTOROLA

Hardware Engineer
– GN MOBILE, GN NETCOM

Connectivity Manager
– AMD

Principle Analyst
– AUTOMOTIVE – ISUPPLI

Principle Engineer
– MEDTRONIC

Digital Cellular RF Product
Line Manager
– ANALOG DEVICES

Senior Applications Engineer
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Project Manager
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– SONY ERICSSON

Development Engineer
– PARROT

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– U.S. DEPARTMENT OF STATE

Director
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President & CEO
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Technical Manager,
Bluetooth Qualification Board
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Senior Engineer
– SAMSUNG ELECTRONICS

Technical Strategist
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ASIC Development manager
– MICROSOFT

Senior manager
Audio/infotainment architectures
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Principle engineer
– PLANTRONICS

Marketing engineer
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– NXP SEMICONDUCTORS

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Listed on this page are just a few recent Incisor subscribers, added to a database built over 8 years.

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Does ZigBee have the X-Factor?



by Dean Gratton

An eclectic number of hopefuls are prepared to stand on stage and sustain a berating from a number of seasoned panellists. The majority of these hopefuls, at best, remain delusional about their ability to hold a note; yet, with their over confident and misguided support, they have a bash anyway. ZigBee is yet another hopeful in a line-up of short-range wireless technologies; each expecting to receive that all important contract and see a career that will sustain itself over several years, if not decades. Yet, is ZigBee capable of holding its own in the short-range arena? Or has it become just another delusional contestant, whose tone-deaf mother insists "Isn't she an angel? She has a voice just like Whitney Houston; I just know she's gonna win."?

The question is: do we need ZigBee? Or is it just another seasonal one-hit wonder that will inevitably be banished to a life of cabaret entertainment? Fatefully, is this an accurate reality in light of Simon Cowell's insistence that "this is one of the worst performances I have ever heard"? Perhaps, realistically, the presupposition is that other short-range wireless technologies are just as capable of performing and holding that all important note. We are faced with a number of short-range wireless technologies purporting various features, applications and capabilities that surpass ZigBee's modest inherent attributes. In a number of proposed new releases and addendums to the ZigBee specification there is some confusion as to the compatibility of combining mixed revisions of network nodes – not a particularly good start for a very young technology. You may be horrified by the notion that ZigBee could be rendered pointless by other Starz In Their Eyes (Just Jack) wannabes, especially if your company has already invested heavily in the technology. In particular, companies such as Ember, Freescale and Chipcon (now acquired by Texas Instruments) offer ZigBee System-on-Chip (SoC) solutions.

The two heavyweights, namely TI and Freescale, offer ZigBee as yet another silicon solution in their healthy wireless portfolio, whereas Ember has invested hugely in making ZigBee its sole silicon offering. All is not doom and gloom though, and Simon Cowell isn't necessarily shouting "next". Ember has remained adamant that ZigBee technology is by far the best, boasting its many consumer-friendly virtues, including those of "delivering dramatic improvements in the quality of life for consumers, as well as energy efficiency improvements for homes and the utilities that serve them." (Ember.com)

But back to the competition! Let's look at this Saturday's line-up: 802.15.4, Z-Wave, Wavenis, EnOcean and Wibree or Ultra Low Power (ULP) Bluetooth. It seems that 802.15.4 and ZigBee are used synonymously; you may already be aware that 802.15.4 simply provides the physical (PHY) and medium access control (MAC) layers for the ZigBee protocol stack. The IEEE 802.15.4 working group is responsible for maintaining and defining the standard, which encompasses the low power / low data rate Wireless Personal Area Network (WPAN) activity. The standard itself has undertaken some criticism, as several ambiguities were causing confusion and some features weren't entirely thought out. As such, the rumoured new release of the ZigBee specification will use these revised improvements (notably, 802.15.4b) to overcome initial shortcomings. You may recall that Bluetooth wireless technology endured a series of revisions before 'getting it right'. Incidentally, several companies have taken the 802.15.4 standard as the basis of their own proprietary technology and have successfully developed their individual wireless solutions and, of course, TI and Freescale both offer an 802.15.4 silicon product. Some might argue that sitting around waiting for the Alliance to resolve issues with their initial v1.0 offering was just taking too long.

Moreover, where are we now with ZigBee? It seems as though ZigBee is struggling to find its voice within the marketplace, whilst all the other contestants have moved on.

The ZigBee specifications offer the building blocks of inherent features and applications that are founded upon the 802.15.4 PHY and MAC layers through various profiles. In particular, the ZigBee protocol stack comprises the 802.15.4 layers; the ZigBee profile layers and a series of application layers that are provided by the developer. A number of profiles are used to ultimately define core applications, namely home, commercial and plant control along with affording the developer scalability, in turn, providing bespoke profiles. Furthermore, this assures us of successful interoperability between manufacturers – the basis of all successful wireless communications. The ZigBee network topology comprises a number of nodes forming, in essence, a distributed application. For example, a node may operate a switch whilst another node may operate a light, in turn, enabling a simple (on/off) light switch application. It seems an incredibly smart solution, but many others have followed the ZigBee trend or perhaps visa versa; the ZigBee Alliance have taken their time and alas frustration sets in; "I want it and I want it now" is usually the dominant factor in most marketing strategies.

Z-Wave (from Zensys), on the other hand, has successfully established itself as a technology that provides considerable overlap with ZigBee and has an architecture that is comparable. The premise of both technologies is the formation of a mesh/tree/star network through a series of nodes, as we have already discussed. Zensys was formally part of the ZigBee Alliance. However, due to irreconcilable differences, Zensys withdrew and established its own mesh networking technology, namely Z-Wave. Zensys has now become one of the leaders in residential and commercial



applications covering lighting, appliance and access control and automation, along with the formation of its own Z-Wave Alliance, which to-date, includes over one hundred members. Zensys has reacted quickly to an increasing market demand, with many manufacturers already using their products. However, with the formation of its own Z-Wave Alliance it should be aware of the associated rigmarole of governing the future growth of its technology.

Wavenis (from Coronis Systems) follows the mainstream of short-range offerings providing a low power, cost effective wireless solution. It also supports a mesh/tree/star network topology using the Industrial Medical Scientific (ISM) bands (868MHz, 915MHz and 433MHz) with an optional 2.4GHz solution. It is clearly a trend to use these frequencies, which are very much the mainstream short-range RF solution. Coronis Systems has a large consumer-base boasting over one million products in circulation across Europe and China. Once more, another company has reacted to a market that requires an immediate wireless solution. Similarly, EnOcean uniquely offers a short-range solution that derives its energy from ambient sources – EnOcean describes this as energy harvesting. Using a series of not-so-new techniques, including the conversion of ambient energy into a useable power source, as well as architecting ultra low energy circuitry, in turn, provides a small and high-performance wireless system at an affordable cost. Simply put, we have seen several innovators offering a solution that affords the majority a technology that provides an immediate need to their product roadmap. A product roadmap may span several years and, naturally, as the technology advances there is an evident need to align with the natural evolution of the product. Bluetooth wireless technology has emerged into a seemingly saturated market of short-range wireless technologies, but uniquely the Bluetooth Special Interest Group (SIG) has had foresight regarding its long-term objectives within the marketplace.

The King seems to possess plenty of charm; who says he's dead? Bluetooth wireless technology has charmed its way into Ultra-Wideband's (UWB's) bed and is now shacking up with Wibree (originally defined by Nokia) – where does he get his energy? Likewise, Wavenis is also touting itself within the Bluetooth SIG as a viable ULP solution and ultimately wants to share what has to be one very large bed! In Bluetooth's early days it was very much jack of all trades and master of none – very akin to soprano wannabes covering classics as a fast track to stardom. With a number of tiring

and questionable applications, it seems that the Bluetooth SIG has revisited the myriad of confusing profiles and attempted to capture both application spectrums (UWB at one end and Wibree at the other) assuring its longevity as a pioneering wireless technology. But, as long as it still doesn't waver along the jack of all trades route it should do just fine. In short, Wibree or ULP Bluetooth has ZigBee scared and subsequently, with the right product and marketing strategy, should render it quite pointless.

It is clear there are winners and losers, and mothers who are adamant "she has a wonderful voice." But seriously, looking at the business model and the future product roadmap, developers should adopt a sense of proportion and reality when looking to select the right wireless technology for their particular application. Whilst ZigBee and its supporting layers were taking their first audition and floundered in finding the 'X-spot' on stage, Z-Wave, Wavenis, EnOcean and Wibree had already moved on to boot camp. In a market that is dominated by power hungry and overkill applications such as Wi-Fi and formerly Bluetooth, it has become clear that other companies have become restless and desperately want a low power modest solution that will do the job now. Technologies, such as Z-Wave, Wavenis, EnOcean and Wibree have initiated a short-range revolution that provides an immediate answer. It is also evident, that the Bluetooth SIG's strategic partnering with Nokia should undoubtedly pave the way to a technology stardom that may appeal to the masses. As such, it may acquire that all too often elusive multi-million pound contract.

And finally, that question; do we need ZigBee? In the same way as we would cringingly witness the promising angelic daughter failing to impress the judges with her unconvincing Whitney Houston-like warbling, ZigBee, it would also seem, clearly won't make it through to the next round.

Snippets

New 8-pin EEPROM from Atmel

Atmel Corporation has launched what it claims is the industry's first 128K-bit Serial EEPROM device in an 8-pin XDFN package with overall z-height of 0.40mm. The 8-pin XDFN (1.8 x 2.2 x 0.40mm) package is now offered in 2-wire Serial EEPROM (AT24) and SPI Serial EEPROM (AT25) protocols: 2-wire Serial EEPROM densities range from 1K-bit to 128K-bit and SPI densities range from 1K-bit to 16K-bit. The XDFN package is described as ideal for a wide range of height constraint communication applications including headsets, Wireless LAN and Bluetooth modules.

Bluetooth

Bluetooth in automotive – IMS

IMS Research has just published a report that looks at Bluetooth in automotive applications. The report examines the market by use case, product type and country/region. In terms of use case the report breaks the market into hands free calling, audio streaming, video streaming and 'other'.

For the hands free calling application the market forecasts are broken down into more than 25 countries and for the other applications the market is broken down by major region. Forecasts are provided for the period 2006 to 2015.

connectBlue expands Bluetooth Serial Port Adapters

Industrial devices with limited CPU and memory capacity can now utilize the Bluetooth File Transfer (FTP) and Object Push (OPP) profiles without implementing a Bluetooth stack. The Serial Port Adapter from connectBlue now includes support for the FTP and OPP profiles in addition to the previously supported Serial Port Profile (SPP) and Dial-up Networking (DUN) profiles. By offering the FTP and OPP profile support in the Serial Port Adapter, connectBlue provides an implementation of both the FTP and OPP solutions in a host CPU.

zigbee / 802.15.4 news



2.4GHz wireless sensor networking out of the box

It seems there is always someone looking to blow ZigBee's house down. This time, the big bad wolf has a partner. Incisor hears that fabless developer Nordic Semiconductor has combined its 2.4GHz transceivers with Dynastream's ANT ultra-low power wireless protocol to launch a wireless sensor network development kit. The two companies claim that by using the kit, engineers will be able to build a functioning 2.4GHz wireless sensor network within minutes to test their specific applications.

ANT uses bi-directional 2.4GHz ISM band RF communications and adaptive isochronous (TDMA-like) channels supporting multiple frequencies and high-density networking. The protocol is able to support multiple data transfer modes with a raw data rate of 1 Mbit/s and a burst data rate of up to 20 kbit/s. Prime applications include sensor networks, industrial automation, home automation and sports monitoring.

Using ANT, a designer can set-up the radio to spend most of its time in an ultra-low power sleep mode, wake up quickly, transmit for the shortest possible time and then rapidly return to sleep mode. Typical duty cycles (the ratio of transmit/receive time to sleep time) for WSNs are much less than one percent, resulting in average power consumption in the microamp range when employing ANT.

Dynastream told Incisor that ANT is ideal for point-to-point, star and tree networks with a capability of up to 65,000 nodes talking to one master over a time slot shared single channel. In addition, ANT is capable of having a practical mesh network built on top of it when this greater network complexity is required.

"To realize the huge potential of wireless sensor networking, design engineers need to

be able to build complex networks easily without years of specialist programming experience. With the ANTDKT3, network construction is that simple. And the ANT protocol allows nodes to be added in an ad hoc manner - avoiding the need to reconfigure the whole network. We call this whole approach 'Practical Wireless Networking'." said ANT's Director, Brian Macdonald.

Look out, ZigBee. It's time to close the shutters, bolt the door and pray that the big hairy beast outside is lacking in puff.

Ember and Computime offer ZigBee modules ZigBee platform

Ember and Computime announced they have teamed to offer OEMs a family of what are claimed to be low-cost plug-and-play ZigBee modules based on Ember's EM250 and EM260 chipsets and EmberZNet ZigBee software.

Ember will be well-known to Incisor readers, but Computime less so, we suspect. Headquartered in Hong Kong, it is a technology and manufacturing company that provides automation and control solutions to customers in the industrial, commercial and consumer markets.

The Computime CT-EM250 and CT-EM260 RF Transceiver Modules are low-power devices designed to embed wireless mesh networking capabilities into products for building and home automation, security and lighting controls, home appliance and alarms, remote monitoring and automatic meter reading applications. Computime will also offer fully developed, plug-and-play home automation and automatic metering products for consumers based on Ember's ZigBee technology.

The CT-EM250 and CT-EM260 RF Transceiver Modules integrate a 2.4GHz,

IEEE 802.15.4-compliant transceiver with a 16-bit XAP2b microprocessor. They consist of integrated Flash and RAM memory and peripherals. The module contains qualified RF hardware and enough processor power to run the EmberZNet stack or other ZigBee network stack (depending on version).

TI gives developers stick

Aimed at developers in the low-power wireless systems market, Texas Instruments (TI) has announced a new tool for designing embedded systems that combines ultra-low-power MSP430 microcontrollers (MCU) with wireless communications. Priced at \$49, TI's new eZ430-RF2500 development tool, packaged in a USB stick form factor, offers two radio frequency (RF)-enabled microcontroller target boards and a PC debugging interface that can be used to develop stand-alone wireless projects. The eZ430-RF2500 follows TI's eZ430-F2013 development tool, introduced in early 2006.

TI suggests that the eZ430-RF2500 opens up new possibilities for low-power designs combined with wireless communications. "Recognizing the strong demand for the eZ430-F2013 and the versatility of the target boards used to develop customer end products, we understand that a low cost tool with wireless capabilities is the next 'must have' for developers," said Cornelia Huelstrunk, product marketing manager, MSP430, Texas Instruments. "With the eZ430-RF2500, we are committed to meeting market needs, as more applications require wireless communications."

The eZ430-RF2500 development tool provides all the hardware and software needed to program the MSP430 MCU and the Low-Power RF 2.4-GHz transceiver on the postage stamp-sized target board. The USB stick development interface plugs into a PC port with no additional driver software, and then connects directly to an MCU-RF target board—the eZ430-RF2500T.

Acquisition activity heats up in GPS IC market



Market research business In-Stat says that the GPS component market has been marked by much acquisition activity in summer 2007, with expectations for more acquisitions in the near future. The main reason for this seems to lie with the fact that the GPS market itself is really starting to ramp up, especially in the market segments of portable navigation devices (PNDs), cellular handsets and in other portable consumer electronics devices. Large chipset vendors want to be able to offer in-house GPS as part of their cellular handset and/or portable CE device platforms. At the same time, GPS-chipset specific companies are looking to be able to provide more powerful and enhanced GPS platform solutions, rather than just standalone GPS chipsets.

Giants step in

Two major acquisitions occurred in summer 2007. First, Broadcom acquired Global Locate. Broadcom expects to pay approximately \$146 million net in cash at closing in exchange for all outstanding shares of capital stock and other rights of Global Locate. Global Locate has been focusing on GPS chipset and software

solutions for the cellular handset market segment since its inception in 2000. With Global Locate now a part of Broadcom's wireless division, Broadcom is now a provider of four major wireless technologies that are increasingly being added to mobile handsets: Bluetooth, Wi-Fi, FM radio and GPS. This greatly strengthens its cellular handset platform offerings. Broadcom also acquired home-grown A-GPS technology with Global Locate, allowing for Broadcom to utilize A-GPS technology without worrying about any third party licensing issues. The acquisition also includes Global Locate's World Wide Reference Network (WWRN), which provides for real time A-GPS data as well as Long-Term Orbit (LTO) solutions to provide assistance even when a network connection is not available. Several carriers have adopted Global Locate's A-GPS server solution to provide location based services.

Secondly, SiRF acquired Centrality Communications. Under the terms of the agreement, SiRF acquired all the outstanding shares of Centrality capital stock in exchange for approximately 8.1 million shares of SiRF's common stock, which includes common stock underlying assumed equity awards,

and \$110 million in cash. SiRF is currently the recognized leader in the PND segment of the GPS chipset market. Centrality brings SiRF a line of powerful SoC processor solutions that feature ARM cores, high-speed DSPs, and hardware GPS accelerators. The acquisition will enable SiRF to offer enhanced GPS platforms, rather than just standalone GPS chipsets, that will ultimately enable their customers to get to market faster with their GPS products.

Don't forget CSR

In-Stat seems to have overlooked the fact that Bluetooth market leader CSR also made a GPS-market acquisition, when it acquired NordNav Technologies AB and Cambridge Positioning Systems Ltd in January this year. CSR said at the time that the combination would allow the company to provide software-based low cost GPS suitable for mass-market mobile phones and PNDs. CSR was also looking to slash the normal add-on cost of \$5-10 associated with adding GPS to a mobile device, forecasting that its software-based architecture would allow the incremental price to fall to less than \$1 of the overall BoM when used with CSR's Bluetooth technology. Matthew Phillips, SVP of CSR's Mobile Handset Connectivity strategic business unit, commented at the time, "At \$5-\$10, current GPS solutions are too expensive and just not practical for mainstream cellphone applications".

Acquisition Expectations

In-Stat believes that NXP is looking to possibly acquire a company that could help it complete its GPS chipset solution; the company wants to be able to offer an in-house GPS solution within its cellular platform as well as within its portable media player platform. There are expectations that Marvell is also shopping around for a GPS chipset company, to allow it to be able to offer a more complete cellular platform solution. Currently, Marvell is lagging Broadcom and TI without having an in-house GPS solution. And, with Marvell really aggressively pushing its XScale cellular solutions (which have gained much recognition in their powering of Apple iPhones), a move to get into the GPS chipset market would make sense.

In-Stat has a report on this market if you wish to know more.

15GBps radio – move over UWB ...



People just never stop inventing new short-range radio technologies, do they? Just when you thought we could mentally allocate UWB to doing the job of transferring large amounts of data rapidly and efficiently, it seems we need to think again. Georgia Tech professor Joy Laskar and other scientists at the Georgia Electronic Design Centre have joined that sector of the industry that is looking to extremely high radio frequencies to transfer huge data files over short distances.

While UWB operates in the sub-10GHz space, these high frequencies use the 60 gigahertz band. As with UWB and Wi-Fi,

this is an unlicensed sector, so getting regulatory approval shouldn't be too much of a problem. With a range that is likely to be less than 33 feet, the risk of interference is low and transmissions could be secure.

Laskar pooh-poohs UWB's current speed of about 480 megabits per second, which matches that of a USB cable, suggesting that the 60 GHz band promises much higher speeds. The centre has already achieved wireless data-transfer rates of 15 gigabits per second from a span of 1 meter. That would mean a download time of less than five seconds for a DVD-quality movie.

Before we all start celebrating, industry commentators have suggested that the signals don't penetrate walls very well and are too easily disturbed by passing people and pets. Laskar believes that any challenges can be overcome in the next year or so, and that the hardware for transferring files could be available by 2009, and new TV sets could be built with the chips the next year. No offence meant, but these do sound like the ambitions of an academic. It's not far off 2008 now, and anyone that has been around the semiconductor industry for a while knows it would be at the soonest three years before we saw retail products, and probably nearer five.



This technology is not completely new. Specialized radios have been sending and receiving high-frequency signals for years, but they're big and can cost tens of thousands of dollars. With the cellphone and computer markets in mind, Laskar has identified the tried and trusted target of a \$5 chip, and so far his researchers have built a few prototypes to show off the technology.

This is a worthy project, but it is unlikely to happen without some support from a specification and standards body. The Institute of Electrical and Electronics Engineers (IEEE) is apparently considering creating a standard, and could decide by next year. Would this be the Kiss of Life, or the Kiss of Death? Other standards, often with plenty of merit and potential, have sunk under the crushing weight of IEEE bureaucracy. Laskar and his colleagues might do well to consider that the technology they are looking to outshine – UWB – only really started to fly (ok, maybe not fly, but at least to start taxiing towards the runway) once it came out from under the IEEE's mantle.

Find yourselves some big-cheese industry partners, guys, and get them to form a Special Interest Group, Forum or Alliance.

Oh, and be realistic about timescales.

uwb/w-usb news



Second round of UWB PHY's registered by WiMedia Alliance

Six additional Physical Layer chipsets (PHYs) have been registered by the WiMedia Alliance, bringing the total number of approved chipsets to 13. These chipsets have been verified as compliant with the WiMedia PHY specification, and approved for use with the Alliance's Ultra-Wideband (UWB) Common Radio Platform.

WiMedia PHY registration is the first of two parts comprising the Alliance's certification program. At a recent registration event, WiMedia members Alereon, Realtek Semiconductor, Tzero and Wisair successfully tested chipsets against the WiMedia specification, resulting in official PHY registration for their products. Registered PHYs are eligible for use in UWB platforms that can be submitted for WiMedia certification.

"We are very pleased to see the large number of chip manufacturers registering products," said Stephen Wood, president of the WiMedia Alliance. "These offerings will provide a healthy competition in the market by providing choice to original equipment manufacturers (OEMs) who may wish to add UWB to their PCs, cameras, and other devices. This level of competition will also be beneficial in driving the price down rapidly and accelerating adoption."

The six new PHYs announced today join the PHYs registered by Alereon, Realtek Semiconductor, Staccato Communications, Tzero, WiQuest Communications and Wisair in November 2006.

According to the WiMedia Alliance, industry support for WiMedia UWB continues to grow, with membership surpassing 300 in mid-2007. They still have a way to go to catch up with the Bluetooth SIG (9,000 members and counting), but the day is yet young.

D-Link selects WiQuest for Certified Wireless USB products

WiQuest Communications tell us that D-Link's Wireless USB Adapter (DUB-1210) and Hub (DUB-2240), recently certified by the USB-IF, are based on its WQST100 Family solutions.

D-Link's Certified Wireless USB Adapter and Hub will enable users to replace their USB cables and to be wirelessly connect to peripherals such as printers, hard drives, cameras, and other devices at high speeds.

"By working with WiQuest, we ensure that our Certified Wireless USB solutions will lead the market," said Chris Wong, director of product marketing for D-Link Systems, Inc. "WiQuest delivers high performance silicon, robust software and world-class support."

Commenting at the time, Matthew Shoemake, founder, CEO and president of WiQuest Communications, said "WiQuest is committed to working with market leaders to accelerate the proliferation of Certified Wireless USB. DLink's adapter and hub enable consumers to quickly take advantage of this new high-speed wireless connectivity with existing PCs and peripherals."

WiQuest says that it leads the industry in the number of customers with Certified Wireless USB products including three of the top 4 notebook PC OEMs and the top 2 PC peripheral companies and that products based upon WiQuest's silicon began shipping in July 2007.

Icron issued Canadian patent for USB 2.0 extension technology

Icron Technologies, profiled in Incisor earlier this year ([Incisor issue 107](#)) has been issued a patent from the Canadian Intellectual Property Office for enhancements to its ExtremeUSB

technology for high-speed USB 2.0 implementations.

This patent, titled "Method and apparatus for extending the range of the universal serial bus protocol", builds upon Icron's earlier patents covering USB 1.1 range extension. The invention described in the patent enables long-range or increased latency communication between high-speed (480 Mb/s) host controllers and full-speed (12 Mb/s) peripherals. It also provides support for the high-bandwidth peripherals that were introduced by the USB 2.0 specification. The issuance of this patent is the third of a series of applications filed through the Patent Corporation Treaty in Canada, the United States and the United Kingdom. The United Kingdom patent was issued in December 2005 and the US patent was issued in January of 2007.

Regular Incisor readers will remember that Icron's ExtremeUSB 2.0 technology allows manufacturers of PC's, peripherals, and consumer electronics to extend the range that USB 2.0 devices can operate over UTP cable, fiber optics, power line or – and back in Incisor territory – any wireless media at any distance without making any changes to the USB ecosystem. Icron says that it's goal is for users to have a "plug and play" experience right out of the box, requiring no additional drivers, host controller changes, or user configurations. It supports all USB supported operating systems including Windows, MAC OS, Linux, Unix and Solaris.

"As Icron continues to evolve our ExtremeUSB technology and implement it over more and more platforms, we will continue to expand our patent portfolio to protect our intellectual property in the USB technology space," commented Robert Eisses, President and CEO for Icron. "USB 2.0 continues to be the most recognized and successful interface for device connectivity in the PC, CE and mobile device market. Icron continues its leadership in the USB 2.0 market with the receipt of this patent and expansion of its USB 2.0 extension product line including new long distance wired, USB over Power Line and wireless USB solutions."

wi-fi/wlan news



Broadcom delivers new Wi-Fi workhorses

Broadcom is shipping a new low cost single-chip wireless LAN (WLAN) solution that it claims has a 40 percent smaller footprint and consumes half the power of previous Broadcom solutions. The chip's architecture is optimized for single-band or dual-band use, so it can be used to add Wi-Fi to a variety of devices, including notebook PCs, broadband gateways and gaming platforms. Broadcom has also developed a reference design that combines Wi-Fi and Bluetooth capabilities on a standard mini-card.

Broadcom is also claiming the industry's lowest "rest of bill-of-material" (RBOM) costs, but we feel that some of the other semiconductor companies might also want to stake that claim.

"By pushing the boundaries of integration and power management, Broadcom is driving down the cost of existing wireless designs and facilitating new opportunities for Wi-Fi in next-generation devices," said Bill Bunch, Director of Marketing for Broadcom's WLAN line of business. "Our new WLAN platform enables our customers to deliver wireless capabilities in new platforms and at new price points. As a result, we expect to increase Wi-Fi penetration in the high-volume segments where Broadcom is already a strong player."

The focus of the announcement is the Broadcom BCM4312 chip, which integrates an 802.11 MAC, baseband processor, and a dual-band radio (2.4 and 5 GHz) onto a single silicon die. The BCM4312 can be used with a variety of products that use the PCI Express (PCIe) or secure digital I/O (SDIO) interfaces.

Broadcom commented that while Wi-Fi is an increasingly popular feature for

residential gateways, it has already achieved near ubiquitous penetration into notebook PCs. The BCM4312 is said to address three key issues facing PC manufacturers -- size, cost and power consumption. In addition to reducing the cost of the standard minicard form factor, the 10mm x 10mm package enables PC OEMs to implement the new half minicard form factor that enables WLAN in ultra-mobile PCs. Broadcom says that by leveraging the low-power WLAN architecture it designed for cellular handsets and other mobile devices, the BCM4312 can extend notebook PC battery life and reduce RBOM costs by up to 45 percent.

To provide PC manufacturers with additional wireless connectivity options, Broadcom has introduced the new BCM94312MCGB reference design, which integrates the new BCM4312 WLAN chip with Broadcom's BCM2046 Bluetooth chip onto a single PCIe mini-card. The design utilizes a shared antenna system that eliminates the need for separate Wi-Fi and Bluetooth antennas -- resulting in lower component costs and better performance. The new reference design also supports Broadcom's InConcert coexistence technology, a set of enhancements to reduce interference and improve performance in devices using both Wi-Fi and Bluetooth.

The BCM4312 is shipping in production quantities to leading PC OEMs and broadband customers.

Faster undersea Wi-Fi, please

Odd stories pop up from time to time, and this is one of them. As the United States and Canada take their first step toward establishing a cabled ocean observatory, a University of Missouri-Rolla researcher is apparently trying to improve the speed of

wireless underwater communication.

The same acoustic waves that dolphins and whales use to communicate when they are thousands of miles apart can be used by humans to transmit information wirelessly, says Dr. Rosa Zheng, assistant professor of electrical and computer engineering at UMR. Her research focuses on shallow water communications, a tool needed for environmental monitoring and other efforts. Shallow water communication is faced with additional challenges because signals are affected by waves and reflections off the ocean's top and bottom surfaces.

"The amazing thing about acoustic signals is that the lower the frequency, the farther away it can travel," Zheng explains. "The challenge is that acoustic waves have a very limited bandwidth. Our goal is to achieve very high reliability and a high data rate."

Data transfer rates in current undersea communication systems are usually limited to a few kilobits per second, well below the megabits per second offered by radio frequency wireless communications. Zheng plans to use multi-input, multi-output (MIMO) technology -- a technique that leverages multiple paths and antennas -- to increase the data transfer rate to hundreds of kilobits per second.

"MIMO technology provides some challenges because you're sending signals at the same time, using the same frequency band," Zheng says. "Theory proves that it's feasible, but we're still trying to figure out how you separate those signals at the receiver."

Zheng and her University of Missouri-Columbia collaborator have received a three-year, \$270,000 award from the Office of Naval Research to fund their research.

It's amazing what gets funded, isn't it?

wi-fi/wlan news

Seamless handoff between Wi-Fi networks

damaka, which is another of those companies that has decided that it will use the device of not giving it's company name a capital letter – most inconvenient for journalists and mildly confusing for all – says that users can now maintain P2P SIP session continuity as the user changes network from one Wi-Fi to another Wi-Fi network while in motion.

damaka is a Texan company whose core business is providing voice, video, IM,

file transfer, desktop sharing, IPTV and other solutions for desktop/laptop and wireless devices such as smartphones.

According to Satish Gundabathula, CTO of damaka, "Maintaining an un-interrupted peer-to-peer established communication connection within a company campus or educational institution has been increasingly difficult due to different WLAN network connections. damaka has taken the lead in developing an innovative patent pending solution whereby all the sessions within a damaka client will maintain its connections while the network switch happens automatically as the user transits multiple networks.

Hence, the user need not worry about re-login into the client and continue the current session un-interrupted. This provides a better user experience."

damaka says it will shortly be introducing "true mobility" functionality wherein the application would automatically handoff communication sessions irrespective of network -- 3G data, Wi-Fi and WiMAX -- based on service availability to the user.

Analysis

Old wireless standards never die, it seems

By Manek Dubash



You don't put barbed wire around your front door, and most people don't install steel bars in front of their windows. The cost and inconvenience of so doing would just be too much -- greater than the security benefit gained.

Such is now standard fare for the security industry and experts, and most in the industry at least have a nodding acquaintance with the notion that security can never be absolute, but has to bear some relationship to the value of the stuff you're trying to protect, and how much you're prepared to pay to protect it. Your stereo's worth a lot less than the Bank of England, for example -- no matter how good your stereo is -- and the various security measures deployed by you and the bank reflect that.

So it came as a bit of surprise this week to read of a new product that protects users against weaknesses in the WEP encryption scheme. If you remember WEP, then you'll know that it's been widely discredited as a means of wireless network encryption simply because it takes only seconds, using today's technology, to crack it.

According to Airtight, the vendor of said product, it's aiming the kit at a market that doesn't change its hardware much -- namely the retail sector, which is, apparently, still using handheld scanners, cash registers and VoIP phones whose wireless-borne data

flows rely on WEP for protection. According to one story, the new product seeks and blocks cracking attempts, and prevents both spoofed identity attacks and the use of compromised encryption keys.

Interestingly, this seems like a well-targeted product. But it's a pity that the market segment that needs it the most almost certainly won't have seen the news story, and certainly wouldn't shell out for it. I'm talking about small businesses and consumers, in particular those who bought into wireless three or more years ago and whose kit runs happily along, unchanged since that time.

While they're unlikely to be the target of wireless hackery, since the knowledge is so widespread now, it really is worth their while biting the bullet and upgrading their access points to WPA.

As for the clients, upgrading won't be that expensive. It's likely that any laptops old enough not to have built-in wireless -- assuming they've survived this long -- need only a new wireless adaptor. Either that, it'll be the final straw that drives people to Dell's Web site for a new machine. Meanwhile, new laptops will have WPA built in, so there's no excuse.

I think it's about time I changed my three-year-old access point...

Also appeared in Network Weekly, edited by Incisor contributor Manek Dubash.

Network Weekly is a weekly round-up of networking, telecoms and storage news. To subscribe (free of charge), or for more information, contact:

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Snippets

Intel combines WiMax and Wi-Fi

At the recent Intel Developer Forum, Intel executives promised that the pending rollout of WiMAX will usher in a new era of reliable broadband-connected wireless computing starting next year.

Due out in 2008, Intel's Montevina processor technology will span the full range of notebook designs from mini-notes to full size. Montevina will be Intel's first Centrino processor technology for notebooks to offer the option of integrated Wi-Fi and WiMAX wireless technologies for greater wireless broadband access.

Wipro Test Lab authorized by Wi-Fi Alliance

Wipro Technology's facility in Bangalore will serve as a Wi-Fi Alliance Authorized Test Laboratory. Wipro intends to streamline certification and provide faster time to market for Wi-Fi Certified products for members located in India and other areas in Asia.

"India is increasingly becoming a hub for Wi-Fi product development and we have enjoyed success as a pre-certification lab for the Wi-Fi Alliance. We look forward to providing greater support and certification services to current and future Wi-Fi Alliance members," said Mr. C P Gangadharaiyah, senior vice president & worldwide head of Testing Services, Wipro Technologies.

nfc news



NFC enables M-Payment rollout

Large scale roll-out in China

French company Inside Contactless, which builds contactless semiconductor chips, has announced that its MicroRead platform has been selected as the preferred NFC chip for China's Chongqing Province contactless mobile payment commercial deployment. With a population of more than 31 million, Inside believes – and it is hard to imagine that this isn't the case – that this initiative also represents the first large-scale commercial mobile payment deployment in the world. This is apparently the first mobile contactless payment project to link a Chinese mobile operator with banks in a manner that enables Chinese consumers to pay for goods in several thousand merchant locations using their mobile phones.

Since June of this year, Inside has worked with Just In Mobile – a China Mobile Chongqing Company – to deliver 2kpcs NFC phone-embedded MicroRead chips. The application is based on the PBOC (People's Bank of China) standard payment application, which is already deployed on millions of contactless banking cards. The application is stored on the phone's SIM card, which is connected to Inside's MicroRead chip, using the SWP (Single Wire Protocol), which Inside has developed in conjunction with Gemalto. SWP has now been adopted by the entire SIM card industry, following the GSMA's support in its Near Field Communications (NFC) technical guidelines white paper, which was published in April 2007.

The Chongqing NFC/mobile contactless payment project will enable direct feedback to be gathered from mobile operators, retailers and consumers, and will help to

illustrate how consumers can securely and easily make purchases and obtain information, by simply waving their mobile phones past a contactless reader device.

MicroRead connects the NFC chip to the SIM card using the industry standard SWP protocol. Additionally, MicroRead's "battery off" mode enables the NFC and SIM power supplies to be generated from the antenna RF field, to ensure that contactless transactions can be made, even when the handset battery is flat. Inside made sure that MicroRead supports all of the NFC standards, which enables it to behave as both a reader and a card, in order to execute secure contactless transactions. It also enables RFID transactions commonly used for Access control applications.

Commentators from the lead companies were unsurprisingly bullish about progress to date. "We are pleased to be working with Inside Contactless for Chongqing's NFC payment business," said Zheng Zuofei, Vice President of Just In Mobile. "Inside's MicroRead technology delivers the performance needed to ensure a successful customer experience, and we're confident that this will lead to our future mobile payment initiatives in additional Chinese cities."

Simon Hu, Vice President Sales/General Manager for Greater China added "A number of companies have worked well together to make this project a success. In addition to Inside and Just In Mobile, we have also worked closely with Infineon Technologies and integrated a Mifare solution to enable local ticketing payment services.

Inside reports that several other Chinese and international handset manufacturers are also using its NFC solution – and in the months ahead, operators in different cities throughout China are set to adopt Inside's SWP-based NFC solution.

NFC Forum's tag specifications published

The recent publication of the NFC tag specifications is finally opening the door to interoperability and closer co-operation between NFC developers and device manufacturers. This is according to leading NFC IC design and solutions developer, Innovision Research & Technology.

Just announced by the NFC Forum, the new specifications, according to Innovision, underpin the importance of standards in an industry which will be defined ultimately by the successful interoperability between different NFC technologies. It is a particularly significant announcement for application developers and device manufacturers, as the tags are the core ingredient in every NFC project.

"Application developers for 'smart posters' need to know how to write the NDEF data on the tags in such a way that the tags can be read by the NFC devices, such as a mobile phone," commented Innovision's CTO, Heikki Huomo. "On the other hand, the handset manufacturers need the specifications to ensure their NFC-enabled handsets can read, and in some cases write, the NDEF messages to the tags."

The announcement follows the publication last year by the NFC Forum of the four initial NFC tag formats, which include Innovision's Topaz as the type 1 tag format. Topaz is one of only three proprietary tag formats officially mandated by the NFC Forum and supported by all of the leading mobile device manufacturers.

nfc news

NFC Forum swells

Membership of the NFC Forum, which was founded in 2004, has increased to over 130 members, representing 20 percent growth in five months. SCM Microsystems and Toppan Forms join the Forum as Principal members. At the Associate level, new members are Bond Communications, Booz Allen Hamilton, Cherry GmbH, Ecrio, Inc., Ericsson AB, Fuji Electric Holdings, Co. Ltd., Hypercom Corporation, IBM, KPN, Logomotion s.r.o., Over-C, Mobicom Corporation, Payter Holding BV, Sasken

Communications, SOFTBANK Corp., Swisscom Mobile AG, UPEK Inc., Wireless Dynamics, Inc., and Wireless Payment Services LP.

Gerhard Romen, chairman of the NFC Forum Marketing Committee commented: "We are very excited about the strong increase in membership of the NFC Forum. It reflects the growing commercial interest in NFC technology, it underscores the leadership role of the NFC Forum in fostering the commercial adoption of NFC technology, and it brings new perspectives and energy to the NFC ecosystem, which thrives on collaboration."

The NFC Forum membership also includes sponsor-level members HP, MasterCard International, Microsoft Corp., NEC, Nokia, NXP Semiconductors, Panasonic, Renesas Technology, Samsung, Sony Corporation, and Visa International.

Mobile RFID reader with Bluetooth

RFID solutions and services provider Cathexis has launched IDBlue, a pen-sized, Bluetooth-enabled reader for close-proximity RFID applications.

Cathexis claims that IDBlue is compatible with many different types of platform from a wide range of vendors and that the integrated Bluetooth technology, combined with its ability to be used as a stylus, enables interaction with wireless handheld devices. Onboard data storage is said to allow thousands of RFID tags to be read without requiring it to be linked to a computing device.

"Typical RFID handheld readers are bulky, heavy and cumbersome, while the IDBlue is small and lightweight enough to fit in your pocket," said Steve Taylor, CEO, Cathexis. "We are offering a solution that is perfect for those jobs that require a high degree of mobility and accuracy from the reader."

The IDBlue framework integrates with Microsoft BizTalk RFID, part of the upcoming Microsoft BizTalk Server 2006 R2 release, for automating and managing business processes to deliver real-time support for business activities. Microsoft BizTalk RFID provides plug and play management of devices, making adding other RFID-based technologies faster and easier to improve operational efficiency over the long term.

While the RFID market is well served with products that cater to applications that

seek to automate entire processes, such as the shipping and handling of bulk orders, Cathexis says that it is focussing on those applications that require identification and tracking of specific items, typically requiring human interaction. It listed as examples:

- Healthcare, where hospitals need to ensure that drug doses are administered correctly and samples collected accurately.
- Pharmaceutical, where drug trials need to be carefully monitored, right down to the specific batch for each drug capsule.
- Maintenance, repair and overhaul, where assets and work orders need to be tracked, often at remote locations.
- Event management, where booth traffic management and lead retrieval applications would be well served by a mobile RFID reader.

Cathexis claims that IDBlue is the world's first mobile, integrated Bluetooth-enabled RFID reader. Incisor isn't so sure. It appears that the IDBlue pen is a Baracoda product. Baracoda has been selling Bluetooth-enabled RFID readers for quite some time now.

But good luck to Cathexis anyway. If we stopped for a coffee-machine debate every time a 'world's first' claim arrived in a press release, Incisor would never get published and we would all be in permanent caffeine overload.



rfid news

China - the biggest RFID market this year

While Inside Contactless stuffs China full of NFC chips (see '[NFC-enables M-Payment rollout](#)' in this issue), a new report from consultants IDTechEx tells us that this year, for the first time, China has become the world's largest market for RFID by value.

In 2007, the spend on RFID in East Asia will be \$2.7 billion of \$4.96 billion spent globally. The majority of this - \$1.9 billion - is just in China. This is because of a peak in delivery of contactless national identification cards in China prior to the 2008 Olympics. About \$1.65 billion is being spent on 300 million of these cards plus their associated systems being delivered in 2007 out of a project commitment of \$6 billion, the largest of any RFID project in the world.

Add to this \$0.25 billion in other RFID tags and their systems, most of this related to transport, cash replacement and secure access cards, and the resulting \$1.9 billion is 38% by value of the \$4.96 billion global market for RFID cards and systems in 2007.

However, as the deliveries of the national ID card saturate, IDTechEx speculates, China will sink below the US and probably Japan in value of its RFID market but that market will nonetheless be growing very fast. Within ten years it will more than compensate for the drop in delivery of national ID cards, buoyant sectors including animal tagging, transport, cash replacement cards, secure access, manufacturing, military and supply chain applications.

events



DATE	EVENT	LOCATION	NOTES	LINK
Oct 8 - 12 2007	Bluetooth SIG UnPlugFest 28	Brussels, Belgium	-	www.bluetooth.org
Oct 31 - Nov 1 2007	Bluetooth Evolution – Conference & expo	London, UK	Jointly hosted by IMS Research and the Bluetooth SIG	http://www.imsconferences.com/bluetooth/
Nov 6 2007	Bluetooth Developers Conference 2007	Yokohama Royal Park Hotel, Yokohama, Japan	-	www.bluetooth.org
Dec 4 - 5 2007	Wireless Coexistence Summit	San Jose, California, USA	-	http://www.imsconferences.com/WCS/
Jan 2008	2008 Wireless Symposium	Las Vegas, USA	Email: Vince Holton - vholton@incisor.tv or Steven Clarke – sclarke@incisor.tv	
Jan 7 - 10 2008	2008 International CES	Las Vegas, USA	-	http://www.cesweb.org/
Feb 11 - 14 2008	3GSM World Congress	Barcelona, Spain	-	http://www.mobileworldcongress.com/
March 31 2008	Phoenix, Arizona, USA	Bluetooth SIG All Hands meeting	-	www.bluetooth.org

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