

INCISOR™

for the short
range connectivity
environment

Video enabled  Issue 131

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LIFE AFTER CES

THIS ISSUE

IS THE COMMON RADIO PLATFORM THE ANSWER?
CSR ON SMARTER INTEGRATION
THE 60GHZ BUZZ
INTRODUCING THE INCISOR WPAN-EL

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and so - into 2009 we go

Yes, that is it. CES is behind us and we have to get on with the year. What was CES like? Well, I am not the best person to ask. Sure, I was there, and I probably walked 50 miles around the CES halls, but most of those miles were done at a semi-run, not a walk. With the IncisorTV crew I was filming two great new movies. The first was our traditional 'Best of CES' piece for the Bluetooth Special Interest Group. The second was for the WiMedia Alliance, and positions Ultra Wideband at the start of 2009. Both of these movies can be watched at the www.incisor.tv web site, and also accessed from links in this issue. If you do want to know about CES, see below.

We also mark a major milestone this month as we celebrate the creation of a cross-industry panel of short-range wireless experts. Our feature on page 10 tells you how Incisor has pulled together all of the most influential spokespersons across the Bluetooth, DECT, EnOcean, Wi-Fi, WiMedia and ZigBee industries. Over the coming months this group – which we are calling the Incisor W-PANel – will give its views and comments on topics and issues that affect the industry. This month the panel is talking about CES 2009, and the current state of the industry. I am very excited about the potential for co-operation with the W-PANel members.

Finally, you may remember that I set a challenge in last month's issue as to the origin of the 'beer and roaming in Las Vegas' headline to my intro piece. Well, a number of you got it right, but the first response to land in my inbox came from Jeremy Hannon from GE Healthcare.

Jeremy correctly identified that I had cruelly and thoughtlessly twisted the title of Hunter S Thompson's book, Fear and Loathing in Las Vegas, which was made into a movie in 1998.

Well done, Jeremy, and as promised, you win a 12 month subscription to Incisor. What do you mean 'But isn't Incisor membership free anyways?' Er

Vince Holton
Publisher & editor-in-chief, Incisor / IncisorTV

NEW INCISORTV MOVIES THIS MONTH:

(Click image to to view)



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CSR launches credit crunch busting Bluetooth solution

CSR has launched BC5120, a Bluetooth device optimised for consumer electronics, and predicts that the combination of the BC5120, together with BlueCore Session Manager (BCSM) software, will provide the most cost effective and easy to integrate solution for digital TVs, hi-fis, DVD players handheld games consoles and other consumer products. CSR suggests that a typical design will take a matter of weeks rather than months.

CSR's research shows that demand for Bluetooth connectivity in consumer electronic products such as hi-fis and DTVs continues to grow, as does its application in handheld games consoles. Initial consumer application areas for Bluetooth in this market include music streaming to stereo headphones from digital televisions and hi-fis and streaming music to hi-fis and DTVs from Bluetooth MP3 player and music phones. Once Bluetooth is in the hi-fi or DTV then functionality can extend to Bluetooth enabled remote controls with two way communication, and even the ability to act as a hands free device and answer calls in speaker-phone mode from Bluetooth enabled mobile phones.

Typically an application processor in a consumer electronics device is tailored to a specific task and does not have enough on-chip resource to run additional Bluetooth host software. In contrast, CSR says that the BC5120 with BCSM software is specifically designed to tackle this problem and offers a quicker and lower cost alternative to current standalone Bluetooth chips. CSR's BCSM software acts as a thin control layer to allow a main host processor to control the Bluetooth functions of BC5120 with minimum resource implications on the host. Incisor

understands that no changes are needed to current product system architectures or the processor.

The BC5120 IC features an embedded RISC processor and CSR's on-chip Kalimba Digital Signal Processor (DSP). The DSP enables functions such as audio enhancement and echo and noise cancellation technologies using CSR's proprietary Clear Voice Capture (CVC), and CSR's FastStream, a low latency high-quality music and voice CODEC which reduces the latency of the audio link to avoid "lip-sync" issues when listening to music or watching videos using Bluetooth headphones.

CSR's solution is available in Q1 2009 and includes BC5120, BCSM application software, a hardware development board and a software development kit (SDK).

Broadcom makes Bluetooth 10x faster

Broadcom demonstrated a working implementation of next generation Bluetooth at CES. Described as an industry first, the demonstration featured alternative MAC and PHY (AMP) technology that enables Bluetooth to support data rates of up to 24 Megabits per second (Mbps) and a significant increase in range by using other wireless radio technologies, such as 802.11, as its transport medium.

Broadcom's Bluetooth AMP technology was being demonstrated at CES on its wireless solutions including the Broadcom BCM4325 single-chip Bluetooth + Wi-Fi combo device, as well as modules that integrate the BCM2046 single-chip Bluetooth solution and BCM4312 single-chip Wi-Fi device. The demonstration showed fast file transfers between two Broadcom AMP-enabled devices - e.g. PC to PC, PC to mobile phone, mobile phone to mobile phone.



Robert Rango, SVP & general manager of Broadcom's Wireless Connectivity Group commented at the show: "Our unique position as a leader in both Wi-Fi and Bluetooth has enabled us to take leadership in applications that require multiple technologies to work well together in the same device, such as Bluetooth AMP. We look forward to our continued collaboration with the Bluetooth SIG in moving Bluetooth forward."

Broadcom's first AMP technology target for Bluetooth is 802.11g wireless LAN - a radio technology that could increase Bluetooth transfer rates by up to 10x when compared to standard or enhanced data rate (EDR) Bluetooth.

The Bluetooth SIG has been looking at Broadcom's latest offering. Mike Foley, exec director of the Bluetooth SIG commented: "Broadcom's AMP demonstration of Bluetooth running over an 802.11 link highlights the new opportunities for expansion of the consumer electronics applications being driven by the evolving Bluetooth standard. Technologies such as Bluetooth AMP and other key upgrades available in the forthcoming 'Seattle' launch will ensure growing applications for the future."

At CES 2009, Broadcom demonstrated Bluetooth AMP within its InConcert module and single-chip devices, featuring the BCM4325 combo chip and BCM2046 and BCM4312 discrete solutions. InConcert technology provides products enabled with Broadcom Bluetooth and Wi-Fi chips the ability to share the 2.4 GHz frequency range, synchronizing transmissions to maximize throughput and performance for both standards. The Broadcom BCM4325 combines Wi-Fi, Bluetooth and a FM transceiver into a single monolithic solution.



Nokia bleeds

When the cellphone industry needs to know how well it is doing in relation to overall market performance, it generally looks to Nokia to provide a benchmark. Well, instead of aspiring to Nokia's stellar growth, observers may now have to adjust their measurements. Long the standard setter, even Nokia is feeling the pain of the current economic crisis.

The company has just released its fourth quarter 2008 results, which showed net sales of EUR 12.7 billion, down 19% year on year and Devices & Services net sales of EUR 8.1 billion, down 27% year on year. Nokia mobile device volumes were 113.1 million units, down 15% year on year.

Nokia also estimates its mobile device market share as 37% in Q4 2008, down from 40% in Q4 2007 and down from 38% in Q3 2008. The full year 2008 estimated market share was 39%. Operating cash flow was negative EUR 0.3 billion, including the one-time EUR 1.7 billion lump-sum cash payment made to Qualcomm as part of the previously announced license agreement payment that resulted from the long-term, major spat between the two companies, as mentioned in Incisor on multiple occasions.

Commenting on the results, Nokia's CEO, Olli-Pekka Kallasvuo was talking in terms that we're unfamiliar with from Nokia, admitting that times were tough, and suggesting that the company had embarked on a cost-cutting exercise: "We are taking action to reduce overall costs and to preserve our strong capital structure. This is clearly our top priority in the current economic environment. However, it is important for Nokia to continue investing at the proper pace in future growth."

There is no quick fix, and Nokia is predicting that things will get worse before they get better. It is forecasting that

industry mobile device volumes in the first quarter 2009 will decline sequentially to a greater extent than the seasonal sequential decrease in the first quarter of the past few years. If it can be regarded as a highlight, Nokia expects its mobile device market share in the first quarter 2009 to be at approximately the same level sequentially.

Overall, Nokia expects 2009 industry mobile device volumes to decline approximately 10% from 2008 levels.

CSR launches combo GPS, Bluetooth and FM chip

CSR has launched BlueCore BC7830, stating that this is the world's smallest GPS combination device designed for mobile handsets, measuring a mere 11mm² in silicon size. The BC7830 includes GPS, Bluetooth v2.1+EDR, FM transmit and receive technologies and support for Bluetooth low energy all on a single chip. Part of CSR's Connectivity Centre strategy, the chip apparently allows manufacturers to add GPS functionality for less than a dollar and CSR claims that the nearest competing device integrating Bluetooth, FM and GPS is over 50% larger in silicon area terms.

CSR has coined the phrase 'Smart Integration' strategy for the integration methodology that means the chip is specifically architected to support multiple radio technologies. BlueCore BC7830's 'GPS for less than a dollar' figure includes incremental silicon cost as well as the external GPS components required (GPS antenna, associated filtering and clocking components).

"If we analyse the connectivity growth in handsets, we see the attach rates of Bluetooth, FM and GPS as some of the highest in the mobile handset market. By

integrating these three features together in the industry's smallest device, CSR allows manufacturers to include additional functionality in their devices without sacrificing cost or board space," said Matthew Phillips, Senior Vice President, of CSR's Handset Business Unit. He added, "CSR's Connectivity Centre is continuing to enable designers to drastically increase the features of their devices at impressively lower price points."

BlueCore BC7830 also fully supports the forthcoming Bluetooth low energy standard. Because of the small incremental impact in terms of silicon area, and negligible cost of adding Bluetooth low energy to existing Bluetooth chips, the technology is expected to have the fastest uptake of any wireless technology to date. Bluetooth low energy was successfully demonstrated in a handset by CSR in July last year, and analysts predict the technology will be shipped in over 428 million devices by 2010. (ABI)

The Write Way to Spend 2009

Incisor contributor Dr Dean Anthony Gratton has seemingly secured his Spring and Summer 2009 pastime, much to the dismay of his wife, Sarah. Dean has successfully acquired a publishing contract with Auerbach Publications, who will publish his forthcoming title, "The Definitive Handbook of Personal-area Networking Technologies & Protocols" later this year. The gigantic volume will cover the entire range of personal-area technologies, as well as looking at technological convergence – a phenomenon in the wireless telecommunications domain, which is slowly dissolving the boundaries between personal- and wide-area networks. Do you have a wireless product to market/promote?



Sharp and Broadcom showcase Bluetooth in DTV remotes

Broadcom is getting into the remote control business, a trail already blazed by Sony and others in the game controller sector. The Californian wireless chip company has teamed with Sharp Electronics to deliver Bluetooth in next generation digital television (DTV) products. Sharp is now shipping its new AQUOS XS1 series of digital televisions with built-in Bluetooth from Broadcom in both the television and the touch screen remote control.

The release from Broadcom comments that, along with many other CE devices, television sets are evolving, with new applications such as digital picture and media access to Internet-based web sites, home network-based photos, music and video, as well as new services. The company observes that after establishing strong positions in cellular handsets, PCs and wireless headsets, Bluetooth is now moving into other CE segments, and forecasts that the combined worldwide market for key consumer electronics devices (such as set-top boxes, digital televisions and MP3 players) will result in approximately 454 million units shipped in 2009.

Broadcom predicts that Bluetooth will fulfil two key roles in next generation digital TV designs, involving the remote control and the user interface. The remote control takes advantage of Bluetooth to allow viewers control over all aspects of the television while also receiving feedback from the set for display on the remote's display. Since Bluetooth is a radio technology, the remote control does not require a line-of-sight connection with home electronics devices, which in turn, allows the remote to be used from any room in the house.

Bluetooth's second role in DTV design is as a media transfer interface. As Bluetooth-enabled mobile phones can perform a

"picture push" function (transferring images from the handset to another device), digital televisions, PCs or other devices can receive and display images via Bluetooth. Additionally, consumers can listen to their television programs over Bluetooth stereo headsets.

Does this sound like the death knell for the IR remote control? It is pretty well entrenched, but IR is also a very old, inflexible technology. And others are going down the Bluetooth road too – see below.

Growth for RF remote controls

The traditional infra-red remote control device used to command consumer electronics equipment including TVs and STBs is good at what it does, but in today's terms somewhat limited, according to ABI Research. Even "universal" remotes that control multiple devices are quite one-dimensional. If some major CE manufacturers have their way, says ABI, the next generation of remotes will be based on RF technology. The growth curve for these products is just beginning, but is forecast to show a 55% compound annual growth rate (CAGR) through 2014.

IR remotes work fine, so why move to RF? The reason is interactivity, which is becoming prevalent in today's digital home. As more devices add Internet connectivity and the ability for two-way communication and greater interactivity, RF remotes offer the prospect of better communication with devices: they can sense the status of the devices they control, for example, and report that back to the user. Users can also input information through more evolved interfaces. There's no need for the line-of-site required by IR, so an RF remote could control a set-top box or audio receiver in another room.

The move to RF remotes is being driven by major OEMs, not by consumer demand.

But, ABI analyst Jason Blackwell commented, "If vendors can make consumers aware of the benefits, that will drive consumer adoption. And, if manufacturers can offer a remote that works with a wide range of devices, RF adoption becomes that much easier." To that end, a number of manufacturers are currently hammering out standards.

CSR and Unify4Life turn BlackBerry into universal remote control

CSR and Unify4Life have partnered to develop a lifestyle application for BlackBerry smartphones. The Unify4Life AV|Shadow uses CSR's BlueCore5-Multimedia silicon to transform a BlackBerry smartphone into a universal remote control to manage various electronic devices around the home from DVD players, sound systems and TVs to even garage doors, iPods and lights.

The solution consists of an AV|Shadow that communicates with a BlackBerry smartphone using CSR's Bluetooth, and talks to other electrical equipment via infrared (IR) or by using IR Extenders. Users will be able to directly control a variety of electronic devices and even stream music directly from their BlackBerry via Bluetooth to an amplifier or receiver up to 30ft away. The solution also features interactive TV listings (UnifyGuide) and channel changing functionality to allow users to browse program guides, set reminders on phone calendars and create a TV favourites list.

By installing the AV|Shadow into a central location, users can programme the device using their dedicated www.unify4life.com web account and download the remote application to their BlackBerry smartphone to wirelessly control programmed devices. The AV|Shadow can communicate with up to sixteen devices in a room and lets users control multiple devices simultaneously, e.g. changing the volume on an amplifier while watching a DVD.

New movies appearing now at Incisor TV:



Incisor TV filmed two important new movies at CES 2009

WiMedia Alliance – Ultra Wideband in 2009

As Ultra Wideband-enabled products reach the market, the WiMedia Alliance provides a comprehensive update on developments in the Ultra Wideband industry, and showcases a series of finished products for the consumer and business markets

Bluetooth Special Interest Group / Best of CES

Incisor TV reviews a year of Bluetooth with Bluetooth SIG executive director Mike Foley, and once again covers the SIG's annual Best Bluetooth of CES contest.

Both new movies are showing now at the www.incisor.tv web site.

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A FINGER ON THE PULSE OF WPAN



DECT Forum addresses security challenges

There has been a kerfuffle on the Interweb recently, with another collection of self-professed 'security experts' (pro-hackers) turning their attention to DECT (Digital Enhanced Cordless Telecommunication). Summarised briefly, a session at the 25th Chaos Communication Congress in Berlin suggested that if you want to keep your confidential telephone calls confidential, you'd be well advised to give telephones based on the widely-used DECT wireless telephony standard a miss. It is, it was said, easy to eavesdrop on conversations taking place on DECT phones.

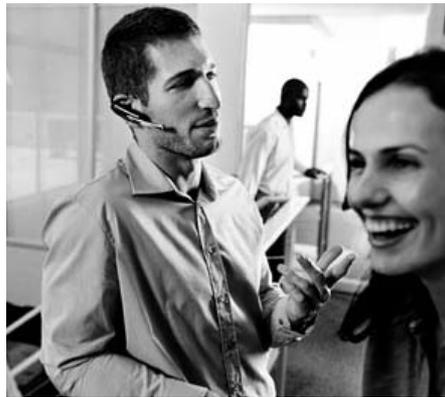
Incisor has been in talks recently with the DECT Forum, as we will produce a movie for them during February that will be published by IncisorTV and through other channels. Our talks had to fit around urgent meetings and discussions that took place within the DECT Forum to address this challenge, so we know from personal experience that the DECT execs took the matter seriously.

This was the official statement that was issued:

The DECT Forum, the worldwide association of the home communication industry, has taken note of reports about possible security issues of DECT wireless telephony systems. The DECT Forum assures that it takes such reports seriously and will consider these investigations.

"The DECT Forum welcomes open discussions about how the implementations of the DECT standard can be improved", says Erich Kamperschroer, Chairman of the DECT Forum. "Therefore we are looking forward to collaboration with researchers in order to discuss their research results and find measures how to further improve a reliable and mature technology that is used worldwide every day by millions of users."

The DECT Forum also states that it is a criminal act to eavesdrop telephone conversations. It is impossible to accidentally eavesdrop on telephone conversations and therefore the risk



for users is very low. Only those with a clear criminal energy and intent and a sophisticated knowledge would be capable of eavesdropping.

With the introduction of CAT-iq (Cordless Advanced Technology), the successor of DECT, the DECT Forum has demanded highest possible security protection measures as mandatory, which will be implemented into a globally applicable standard.

As long as people are transmitting data, and however they do it, there will be somebody out there saying that the chosen methodology is un-safe. In case anybody out there hasn't noticed, these people profit from it.

There is no way of making the wallet in your pocket un-stealable, but will we stop carrying them around? No, we just take whatever sensible precautions we can. Which are generally rather less well thought out than the security systems applied as a matter of course to all wireless data technologies.

Bluetooth replaces home phones

One company that Incisor met with at CES this year was Xtreme Technology, which claims to have reinvented the home phone system with the XLink, a Bluetooth gateway for multiple cell phones. The XLink BT & BTTN models pass cell phone calls through the regular telephones throughout your house and come equipped with a new long distance solution which is aimed at eliminating service charges and saving consumers money.

With a tight economy, Xtreme's execs told Incisor that consumers have been cutting corners where they can, and landline phone service has been one of the first things to go. The XLink BT & BTTN route cell phone calls through the regular phone systems in the house even when you have decided to abandon landline service.

The XLink products allow people to make and receive cell phone calls through their landline



while cell phones can sit charging in a location where service is good. Each cell phone line has a distinct ring throughout the house, making the line easy to identify. When making a call, users can choose which cellular line, or the landline to make a call from.

Cutting the cord isn't for everyone. The XLink BTTN supports the regular landline service while simultaneously routing up to three cell phones through your home phone system, effectively making your home phone the carrier of all four lines. Xtreme told Incisor that the XLink has been future-proofed and is compatible with new cell phones and download features such as Skype support.

CSR releases TrueWireless Stereo dev kit

CSR has launched TrueWireless Stereo, a new software development kit for high-end Bluetooth stereo headphones and speakers. Based on CSR's BlueCore5-Multimedia platform, TrueWireless Stereo is aimed at manufacturers developing high quality Bluetooth stereo headsets and speakers.

The development kit is based on the use of two Bluetooth devices, one as the master and the other as the slave. The call handling and control are supported on the master device which then relays the audio stream to the slave headset. This allows the product to work with any existing A2DP device already on the market. Audio is streamed from the audio source to the master unit and is relayed to the slave using CSR's proprietary synchronisation protocol, resulting in wireless stereo sound to either a headset or speakers.

CSR's TrueWireless Stereo software development kit features the company's proprietary audio enhancement technologies, including Clear Voice Capture (CVC) for improved audio quality through a microphone, and clearer audio through the earpiece through noise cancellation. TrueWireless stereo also supports Bluetooth version 2.1 + EDR along with sub-band coding or MP3 audio file formats.

The TrueWireless Stereo SDK is available now on a BlueCore5-Multimedia platform.



Philips and Nokia to boost DLNA

Imagine a world where you play your mobile music on your home stereo, where you control your music devices with your mobile, where digital content flies between your home devices and your phone.

Nokia and Philips claim to be building that world. The two companies have announced a new collaboration to bring consumers the ultimate user-friendly home experience supported by the DLNA (Digital Living Network Alliance) protocol. If you are unfamiliar with DLNA, or need a refresh, see [Incisor issue 109](#) – “DLNA goes global” and [Incisor issue 127](#) – ‘A smart home for the 21st Century.

Nokia's Home Media Solution and Philips' Streamium products are aimed at giving consumers a simple, seamless, and interactive out-of-the-box experience. The Philips Streamium wireless audio products will let users stream music from their mobile devices or from another DLNA-enabled device like a PC in order to enjoy the music at home. With their Nokia mobile device, users can control the Philips wireless audio systems and interact with their music that's stored on their phone, on their PC or on the audio device.

The Nokia Connected Home is a set of Home Media applications and services allowing Nokia mobile users to enjoy their digital music, photos and videos through TV and stereos wirelessly at home. All you need, apparently, is a compatible Nokia Nseries multimedia device, a wireless network solution and a compatible PC or a supported UPnP/DLNA media renderer or server, such as a television, home stereo system or a gaming console. Nokia claims that the Home Media solution is now available on millions of Nseries devices, including the Nokia N96 and Nokia N95 8GB.

Meanwhile, over at Philips, the range of Streamium products includes the Philips Wireless Music Center (WACS7500) with its satellites, the wireless music station (WAS6050), and the Philips Network Music Players (NP1100, NP2500 and NP2900). Philips claims that all models of the Network Music Players' range easily integrate into an existing wireless network and stream Internet radio as well as music from the PC wirelessly to any room in the house.

"We know consumers are increasingly listening to music on mobile phones. However, when they come home, they prefer listening to their music via their normal stereos. We therefore consider a seamless experience between Nokia multimedia devices and Philips Streamium home audio a vital element to deliver simplicity to our consumers," commented Wiebo Vaartjes, general manager, audio, video & multimedia Applications, at Philips Consumer Lifestyle. "We are therefore proud to announce this collaboration with Nokia, comprising the next step in our commitment to truly deliver and promote the interoperability between our products via the open DLNA standard."

Back in that issue 109 of Incisor, we suggested that DLNA was setting out to achieve some lofty goals. With companies like Nokia and Philips pushing it along, it could be getting closer to hitting some of them. However, we remain a little unconvinced. Too many standards, too many vendors with partisan interests. Will DLNA happen? We will have to wait and see.



Broadcom pitches Bluetooth at mobile PC market

Broadcom, saying it is setting out to drive the adoption of Bluetooth in notebook PCs and in the new class of netbooks, unveiled new solutions at CES that are claimed to reduce PC manufacturing costs by up to 30 percent, and new IT Manager software that allows network administrators to control Bluetooth usage while closing security holes in enterprise environments.

The Broadcom BCM2070 Bluetooth 2.1 + EDR chip utilizes 65 nanometre (nm) process geometry and can enable notebook PC module designs that are less than 6.5mm wide. The BCM2070 also offers serial flash memory, which is less expensive than parallel flash alternatives but enables enhanced firmware upgradeability.

Broadcom also announced its new IT Manager software that provides centralized control of Bluetooth applications and closes security holes that Broadcom claims have 'hindered Bluetooth adoption in enterprise notebooks'. Using the software, network administrators can implement access policies and manage the use of Bluetooth in the enterprise environment. IT Manager apparently enables employees to enjoy the benefits of Bluetooth to use wireless mice and keyboards, synchronize data between their PC and other devices, and stream multimedia content without jeopardizing the security of a corporate network.

IT Manager is a component of Broadcom's BTW Bluetooth software, the latest release of which, BTW 6.2, was selected as a finalist for the Bluetooth Special Interest Group (SIG) "Best of CES" (see Incisor TV movie – Bluetooth SIG Best of CES).

According to Broadcom's CES announcement, the BCM2070 version of its Bluetooth transceiver and IT Manager software are sampling now.

new products



Nokia and Polar bring Bluetooth-based sports app to market

We have been hearing for a long time about health and sports/fitness applications for Bluetooth, most often in connection with the technology's move in the low-energy RF direction – Bluetooth low energy, as we now know it (see [IncisorTV movie for Bluetooth SIG – Bluetooth low energy](#)).

Although no specific mention is made of Bluetooth low energy, and therefore we assume that it is classic Bluetooth that is being used here, Nokia has taken a leap into this arena (groan ...) with the Nokia N79 Active. This ships with the wireless Polar Bluetooth WearLink heart rate belt from Polar, which is already well established in sports instruments and heart rate monitoring, and is pitched as "the perfect running companion".

First shipments of the device include A-GPS tracking and a new version of the Nokia Sports Tracker application, so that you can record and publish your favourite routes and fitness data on the web. You can also share the tracks you listened to while working out, as well as upload and geotag route images taken with the Nokia N79 Active's built-in 5 Megapixel camera with Carl Zeiss optics.

"With Sports Tracker you can add a new social dimension to your fitness program by building up and sharing a great record of all your workouts. This is an inspiring way to track your progress and to challenge yourself and fellow workout partners." said Juha Kokkonen, Director, Nokia Nseries.

The Active version of the Nokia N79, which is - many Nokia fans will be relieved to hear - the smallest Nokia Nseries device to date, ships with sporty headphones and an armband so you can keep yourself plugged in as you work out. and a 4GB microSD memory card for your music. Nokia's iTunes-rivalling Music Store means users can add new tracks to their playlists over the air or they can tune in to the radio with the handset's FM transmitter.



The Nokia N79 Active will apparently be available in select markets soon for an estimated retail price of EUR 375 before taxes and subsidies.

Postscript: As your writer recently gave up running, having turned his knee-joints to porridge after many years of US president-style stumbling along in questionable running gear, don't expect a review in Incisor any time soon.

JVC Mobile embraces in-car Bluetooth

In addition to health and sports applications, we have been hearing for a long time that Bluetooth will be big in cars. So far we have had all sorts of Bluetooth-enabled gadgets that generally plugged in to your cigarette lighter socket or clipped to your sun visor, and which provided varying degrees of Bluetooth interaction. Don't say this too loud, but most so far have been pretty awful.

The car makers have been slowly (read glacial) putting Bluetooth into ICE systems in their cars, but that probably accounts for about 1% of the cars on the road. And when you can buy a Bluetooth option in your new car, it is often stupidly expensive – hundreds of pounds, Euros or dollars, when a decent Bluetooth headset can be bought for about \$40.

It is encouraging, then, that some of the major manufacturers of aftermarket, in-dash systems, are finally stepping up to the plate. JVC, for example, has just launched seven new in-dash CD receivers, and six of them are Bluetooth-enabled.

JVC's way of handling the Bluetooth side of things is not to go for full integration. No, this is a sort of half-way house. All of the receivers feature two - or in the case of the lowest cost systems, one - full-speed USB 2.0 ports for connection of a Bluetooth adapter or an iPod/iPhone, USB flash memory drives, digital audio players and portable HDD devices. The receivers include full Bluetooth functionality, including hands-free phone calling and wireless audio streaming capability via the included USB Bluetooth adapter and an external



wired microphone. The Bluetooth adapter, which is supplied with all but the lowest cost systems and is an option with the others, operates as a fully-functional receiver, transmitter, and antenna for Bluetooth and plugs into the USB port.

The Bluetooth-ready receivers from JVC, which are shipping now, range in price from \$269.95 at the top end, down to \$119.95, so these are by no means high-end products. For the deeper of pocket, JVC Mobile is also providing fully-integrated Bluetooth in its high-end in-dash products, which it calls AV Multimedia Receivers, which retail from \$650 and upwards, and in its NW-NT1 Navigation device.

Cool shades, dude

For all of those that still recoil from the idea of wearing a geeky Bluetooth headset, US company Tri-Specs claims to be combining high-tech and high-fashion in user-friendly consumer electronics.

Its new, Bluetooth-enabled sunglasses combine dual microphones and dual speakers with acoustic technology that provides noise cancellation, optimised voice quality and acoustically enhanced stereo sound. All controlled by using buttons on the arms of the glasses.

TriSpecs has integrated STEPvoice software from STEP Labs, which uses the physics of sound propagation to define the shape and arrival time of sound waves to isolate voice signals from undesired noises. STEP Labs tells us that its software is able to tell the difference between the wearer's voice and other voices, sounds, and noises, preserving the natural fidelity of the voice and producing near-perfect voice recognition performance, and impeccable noise cancellation.

"The form factor of TriSpecs glasses allowed our acoustic engineers to design a dual-microphone solution that produces an unbelievable Bluetooth headset experience, even when surrounded by 95 decibels of noise from the CES show floor," said Michael Hickerson, President of STEP Labs.

TriSpecs sunglasses are now available with a variety of features, styles, and colours.

Introducing the INCISOR W-PANel

Incisor forms an expert panel of the most influential spokespeople in the short-range wireless industry

Introduced by Vince Holton

For many years, I have been working closely with the organisations that conceive wireless technologies, develop standards, oversee bringing those technologies to market and regulate the way companies developing products operate. Although there are many, many special interest groups and alliances out there, the ones that I judge to be the most significant are the Bluetooth Special Interest Group, the DECT Forum, the EnOcean Alliance, the Wi-Fi Alliance, the WiMedia Alliance and the ZigBee Alliance. In case you are wondering, there is no order of importance or value in that listing – I am playing this safe and just listing them alphabetically!

Over the ten years that we have published Incisor magazine, and IncisorTV's video productions, we have communicated with these organisations regularly, but always on topics specific to their own technology. Inevitably, this has distilled the content of our talks, with the focus being either Bluetooth, Wi-Fi, UWB, or whatever. Views expressed are partisan, as is entirely to be expected. However, the short-range wireless space is more of a Milky Way – i.e. a collection of stars – than it is a whole universe. In other words, there are relationships between the various wireless technologies out there, commonalities and certainly competition across many of the market sectors in which they operate.

Wouldn't it, then, be a good idea to consolidate views across this whole group, in order to be able to hear broader and more objective viewpoints on topical matters? Wouldn't it be good to hear what, for example, an expert in one technology thinks about the latest and greatest announcement from another?

I certainly thought so, and decided to invite the executives from each of the organisations listed above to participate in a group that I have decided to call the W-PANel. A little corny, I know, with its apparent and slightly constricting allusion to Wireless Personal Area Networking (WPAN), but you could also read it as an abbreviation of Wireless Panel. Anyway, it is just a name, and it is the output of this august body that is important, not what it is called.

The invitees were Mike Foley, exec director of the Bluetooth SIG, Erich Kamperschroer, chairman of the DECT Forum, Graham Martin, chairman of the EnOcean Alliance, Edgar Figueroa, executive director of the Wi-Fi Alliance, Stephen Wood, president of the WiMedia Alliance, and Bob Heile, chairman of the ZigBee Alliance. Each of these is an expert in his area of technology, some don't mind being called 'veterans'.

I am enormously pleased to say that all of these people agreed to participate in the Incisor W-PANel. It is hard to imagine a more qualified group to comment on →



short-range wireless industry matters, and the world in which they operate. In the near future I hope to add an exec from the NFC Forum, as, in my opinion, NFC will be playing an important part in the way that many wireless applications are rolled out.

Over the coming months, the panel will be invited to comment on varying topics. Some of these topics will be technology specific, some will be generic. I've gently and politely suggested to each of the execs that you, our audience, would prefer pithy observations and straight-talking, rather than PR speak. I'm pretty sure I am right on this. From time to time the topics that we cover will be contentious. That is also good – lively debate is very healthy.

We are bringing the group in gently though. January is the month that hosts the Consumer Electronics Show, the world's largest gathering of the great and good in the CE industry. I didn't see much of the show – too busy filming IncisorTV productions for the Bluetooth SIG and the WiMedia Alliance! – so I have invited the W-PANel group to give us their view on developments at CES, and on the general state of the industry in January 2009. These views follow.

Next month, I am inviting the W-PANel to look at high speed wireless. There is a tremendous amount of focus on this element of the short-range wireless business at the moment, and a wide range of technologies competing for a share of the pie. But how much speed do we really need? Which technology is most suitable? Is there really a need? What are the rewards likely to be, and how far away are they? The Incisor W-PANel will provide the most authoritative views you are likely to be able to garner.

I hope you agree with me that this is a great initiative. If you have views, or suggestions as to how we can develop this concept (and I am not short of ideas myself!), email me at vholt@incisor.tv.

Vince Holton
Publisher, Incisor & IncisorTV +
self-proclaimed chairman of the
Incisor W-PANEL.

The Incisor W-PANel responds



Mike Foley
Executive director,
Bluetooth Special
Interest Group

As I walked the show floor at CES this year, I was delighted as ever to see the large amount of innovation and creation taking place with Bluetooth technology in consumer electronics products.

What stood out for me was the number of high-quality music devices streaming music wirelessly via Bluetooth that are coming to market this quarter. I think there are two reasons for this activity:

1) consumers have embraced Bluetooth streaming of audio in their headsets and are ready to do the same in their stereo headphones, and 2) the SIG's constant improvement of the specification along with our member's innovations continue to move the technology forward creating the best wireless experience for the consumer in scenarios for which Bluetooth is perfect - like music.

This year will be the year of wireless music - and this is just the beginning of Bluetooth technology's move into the entertainment scene.

With the highly anticipated adoption of the high speed specification coming in just a few short months, the SIG and its members have come together again to provide the experience consumers crave - wireless entertainment in the home.



Erich Kamperschroer,
Chairman,
the DECT Forum

At this point in time, DECT 6.0 is taking over from older 2.4 GHz and 5.8 GHz technologies, while CAT-iq is gaining in readiness for next generation networks.

In the USA and in further countries abroad, DECT 6.0 is winning market share for cordless communication from current proprietary technology – it is currently at more than 50% in only the third year since introduction. This comes about as a result of DECT advantages such as interference free communication and the competitive cost position. In addition to this, DECT operates in a protected spectrum, and so does not interfere with Bluetooth and Wi-Fi. Therefore, DECT 6.0 is capturing more and more of the 60 million devices per year market in the USA.

Looking forwards, the successor technology for DECT, CAT-iq, is approaching market launch for products. First products have now been certified and it is a clear fact that CAT-iq is a mandatory requirement for the next generation network communication. More and more gateway manufacturers are integrating CAT-iq as a second wireless technology alongside Wi-Fi in their IP routers and gateways.

The industry is now preparing the new wave of CAT-iq products with the release 2.0 of the technology.



Graham Martin,
Chairman,
EnOcean Alliance

The entire world is now moving towards an ecologically aware society through resource saving, efficient use of raw materials and construction of sustainable buildings. In the current economic downturn sustainable building remains a booming market as companies seek to reduce their costs and carbon footprints, property owners strive to differentiate themselves and new government regulations drive to promote uptake of renewable energy technologies. We are therefore currently enjoying a three digit percentage growth in the deployment of wireless and battery-less sensors.

In 2009 we can expect to see an increasing acceptance of battery-less, wireless technology by building professionals as they recognise the value of access to hundreds of multi-vendor interoperable products on the shelves, no interference from Wireless LANs to manage and a simple, easy to install solution. The unique 'no batteries' feature removes the final major barrier in the use of wireless sensors in mass quantities. Now buildings can become energy efficient without the cost and frustration relating to battery maintenance and failure.

12 years ago EnOcean and its former parent company Siemens invented and patented various energy-harvesting powered wireless technologies and focussed on the supply of battery-less wireless technology into building and industrial automation. Tens of thousands of installations have already proven the technology with multiple key projects in the pipeline. For example, Barclays Bank has decided to save substantial energy costs and CO2 output by installing energy harvesting EnOcean technology in over 10,000 branches across the globe.



CES:
Connectivity Stole the Show
Edgar Figueroa,
Wi-Fi Alliance
Executive Director

The most notable thing about CES this year was the central role of connectivity in the entertainment experience. From handsets to portable entertainment devices, from mini-notebooks to home theatre systems, easy access to content is what users want. Consumers expect their gadgets to be connected to a range of content and entertainment options from anywhere: at home, in the office, and around the world.



Recent consumer research from the Wi-Fi Alliance (December 2008) bears this out: eighty-eight percent of those polled agreed that "pretty soon, every high-tech device will have Wi-Fi." What's more, when asked, "If money gets a little tight next month, which of the following would you cut first," 72 percent of those surveyed said they would "cut back on food expenses" before canceling their internet connection. A similar question found that 80 percent of those surveyed would "turn down the heat" in lieu of going without internet service.

All of this points to the importance of industry collaboration to deliver seamless connectivity. Various connection technologies will co-exist in each device; it's incumbent upon us all to: 1) make sure these technologies work well together, 2) that the user always has the most suitable connection for a given situation, and 3) that getting and staying connected is seamless. Consumers expect nothing less.



Stephen Wood
President,
WiMedia Alliance

Everybody knows that attendance at CES was down this year, and empty spaces in the exhibit halls were testimony to the economic times. However, from a WiMedia and wireless technology standpoint there were some positives.

The abundance of ultrathin monitor/displays makes the complementary use of wireless A/V implementations almost a requirement. The careabouts here are video quality & reliability, power consumption and cost. Any technology which offers the best combination of these features will be preferred, resulting in numerous manufacturers visiting our members' displays and booths. It also seems that these manufacturers are now ready to move on from "tire kicking" to real product planning.

As for our "consumer" visitors they now regard the technology as "real" (a

number of new product announcements from various vendors were made at the show) and as we've maintained all along they are more concerned that it works than what technology is under the hood. Finally we were also pleased to see increased interest from more vertical markets such as medical imaging and video conferencing, where the technical advantages of UWB make it an attractive wireless solution.



Bob Heile
Chairman,
ZigBee Alliance

A much stronger green theme was evident at CES 2009 this year. Attendees saw new HDTVs connected to power meters displaying how much energy is being saved; innovative clothes washer/dryer combinations requiring less power and water, plus new and efficient LED lighting options were all on hand.

It was fitting that one of the core applications being demo'ed by ZigBee and many of its member companies was ZigBee's key role and broad adoption in Energy Management and Efficiency. ZigBee Smart Energy is appearing in more and more consumer electronics and is enabling consumers around the world to take control of their daily and real time power consumption. There is a growing movement underway today by utility companies to create and accelerate wireless home area networks (HAN) using ZigBee technology. HANs provide the critical piece that provides consumers with a comprehensive energy management and efficiency solution. The consumer wins with lower energy bills and a variety of lifestyle enhancing consumer electronics which was much more in evidence this year. Utilities also win because they avoid unpopular events like rolling blackouts during hot summer days while reducing their need to build more power plants.

Next year should be even more interesting!

INCISOR TV Video presentations

When it comes to assessing what is really going on in the market, there is no substitute for seeing products in action and hearing 100% accurate information from the people at the sharp end. Incisor TV provides that insight.

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- [Wireless USB special - The future for Wireless USB and UWB](#)
- [Wireless USB special - Wireless USB at CES 2007](#)
- [Vince Holton introduces the High Speed Bluetooth Special Issue](#)
- [Anders Edlund of the Bluetooth SIG - Bluetooth and UWB combined](#)
- [Robin Heydon, CSR - Bluetooth & UWB - The semiconductor company perspective](#)
- [Motorola's Steve Deutscher examines High Speed Bluetooth mobile concepts](#)
- [Motorola video - Jordan's morning](#)

Snippets

Ubiquisys and picoChip collaborate on femtocells

Here at Incisor, we haven't really decided whether femtocells fall into our bailiwick, but activity in that market seems to be picking up, so expect a bit of coverage. We learn that Ubiquisys, a 3G femtocell company, and picoChip, a supplier of femtocell silicon, have

announced that they are working together to integrate the picoChip PC302 processor into the Ubiquisys ZoneGate femtocell. Current ZoneGate femtocells use picoChip's PC202 processor, and this experience has informed the development of the PC302.



A smarter approach to wireless integration

By Matthew Philips, Senior VP, Handset Business Unit

The number of technologies that could go into a current/future mobile phone are huge and growing all of the time – from short-range wireless technologies to almost ubiquitous functions such as cameras and internet capability. These technologies are changing not only how people use their phones, but the fundamental ways in which handsets must be designed.

The challenge that designers now face is which of these technologies to select to offer a handset that is suitably differentiated. It is also crucial that the technologies selected do not have an unwanted impact on the key design elements, particularly on the crucial constraints of portable design; space, cost and power.

In addition to Bluetooth, there is a growing list of other technologies that offer the potential to boost the attractiveness and functionality of a mobile phone. Technologies such as FM radio with RDS functions, or GPS for navigation and the added benefits of location-based services are attractive functions that are set to find their way into a large number of handsets.

Consumers are hungry for these technologies to be integrated into mobile handsets, but only if there is no adverse effect on its usability, design or performance. And although some current high-end handsets have rewritten the rules on how much a mobile phone can sell for, the cost is by and large still an issue.

With the recent launch of the BC7830, CSR has illustrated a pioneering strategy it calls 'Smart Integration'. The BC7830 is a highly-integrated chip and is a good example of the way in which a company can combine functions in a way that makes sense for the customer. This single-chip IC measures less than 11mm² yet includes Bluetooth v2.1 + EDR, Bluetooth low energy, GPS, an FM transmitter and FM receive with RDS.

CSR's 'Smart integration' refers to the ability of these different systems to share resources, and to be aware of what the other on-chip elements are doing – hence a focus on the performance and usability of the end product. This Smart Integration minimises the need for



external components, and the overall cost and size of the final implementation is reduced even further. Competitors are combining technologies in a way that seems crude by comparison.

As an example of how this works, let us look at GPS. Many consumers see the benefit of having navigation technologies on their devices. They've become acquainted with the personal navigation devices (PNDs) in their cars, but also see the value of having this technology in a handheld form factor, to help them navigate the streets of London to find a restaurant or theatre for example. If this is built into their mobile phone and doesn't add to the cost, size or power consumption, then so much the better. From a handset design perspective, OEMs are aware of the demand out there, but are conscious of the challenge of integrating another technology into their designs.

CSR has added its proprietary GPS positioning technology to BC7830 and because GPS is simply a part of the larger architecture it adds less than \$1 to the overall cost of each unit – even when the few external components are added to the bill of materials.

As there is no separate chip for the GPS there's also a substantial saving on the use of valuable PCB space. Such design is both smart for the handset designer and smart for the end user.

This customer-centric approach to combining technologies is key to the concept of Smart Integration. However, CSR does not believe in 'integration for integration's sake' - the antithesis of its own Smart Integration approach. In keeping with its Smart Integration' philosophy CSR will only choose to integrate technologies when it makes sense for the customer. Integration will have to make sense in terms of the balance between cost-add, space, power and performance.

The mobile handset industry is fast moving toward a point where integrating ever more functions inside a single chip seems the sensible way to go. In order to integrate successfully chip-designers must ensure they have an intimate understanding of both their technologies and their market, and make sure their customer's concerns are central to their thinking. Now that is the smart way to integrate!

sponsored contribution

60GHz buzz at CES 2009



By Eric Broockman, CEO, Alereon.

I just returned from CES 2009 held in Las Vegas this past week. Wandering the show floor, there was a great deal of buzz about 60GHz, which resulted in a few articles in various tech journals. One module company announced high volume pricing at \$240 for the guts of a 60GHz solution. By my calculations, that is about \$999 retail. Ouch. Another company announced their proprietary chipset was ready for production. I did manage to see a few prototype product demonstrations of 60GHz. The demonstrations were roped off so that you couldn't interrupt the RF beam – otherwise the link broke. One Tier-1 company's demonstration transmitter was about the size of a paperback version of War and Peace. It had a cool colored transparent plastic case with a heat sink the size of a candy bar. There were chips and boards and wires everywhere. The demo did work, but it was clear to me that if any company ships this system in 2009, it will be in very tiny volumes. I don't work on the 60GHz version of UWB, but it certainly seemed like it will be two years before a solution can reach a price and performance point that makes it truly viable. I also felt a sense of déjà vu from CES in 2004 – when Freescale showed a set of nice wireless video demonstrations using pulse-based UWB. These demonstrations were in the booths of four Tier-1 CE manufacturers. None of the products shown at that CES based on Freescale's proprietary standard ever shipped. Sound familiar?

By contrast, while I was at CES 2009, I did see a nice demonstration of Wireless HDMI using a UWB chipset from TZero in conjunction with an H.264 codec from Cavium. The system was impressive; it worked well and visually looked good. It also had such an undetectable latency that it could be used in gaming applications and standard STB or Blu-Ray player wireless HDMI applications. I couldn't tell from looking at the circuit board how cost effective the solution was; however, it was smaller than the 60GHz box I saw and didn't have a 4" heat sink.

As I think more about 60GHz, I'm also bothered by the issue of standards. Most CE companies join all of the standards

groups because they don't know which one will win. They are standards pluralists and aren't monogamous. In the 60GHz standardization world we have WirelessHD, WHDMI, IEEE 802.15.3c, ECMA-387 and the IEEE VHT 60GHz WiFi group already battling. No doubt there is probably some big company effort lurking in the background as well. Nearly every CE company is a member of almost every one of these standards groups. Therefore, using some big company's logo on your standard means a bit less than the ink it is printed with. In the CE world there are no interesting volumes until you get a standard. This standards effort again is reminiscent of the UWB standards battle in the IEEE during 2004 – but worse. The UWB battle was essentially between two proposals that ultimately came to an end when the IEEE dropped their effort in January 2006. The industry agreed on the WiMedia OFDM based UWB standard, which was completed through ECMA as ECMA-368. Expect 2009 to be the smack down in the 60GHz standards wars.

So, what is the outlook for 60GHz? Not being intimately close to the technology, I am speculating a bit, but I suspect we will see some very low volume "concept car" products using 60GHz in 2009. I expect that the mostly line-of-sight nature of the technology will get mixed reviews and it will be hit hard by the high price. The standards battles in 60GHz are likely to heat up by mid-year, with the normal FUD wars swinging into full gear. With a difficult economy, some of the 60GHz products shown at CES will be postponed – ostensibly for economic reasons, but probably for deeper reasons. Ultimately, the standards battle will work itself out and the prices of these systems will come down. I fully expect 60GHz video systems to find a way into people's living rooms – in 2011 or 2012. It won't, however, be the only way to receive video in your living room. The options will be plentiful. Some will be wireless and based on UWB; others will be coax connections. Still others may be HomePlug powerline connections. There isn't going to be just one solution or one winner. I am looking forward to my first wireless HDTV – though I think mine will be UWB based. "Life without wires" is getting closer to reality every day.

Snippets

Motorola cuts more jobs

Motorola said it would cut 4,000 jobs in 2009, on top of the 3,000 it had announced last year. Motorola's cellphone sales plummeted more than 50% in its fourth quarter, with the handset maker selling just 19 million phones compared with more than 40 million in the fourth quarter of 2007. The company said that 3,000 of the new job cuts would come from its mobile devices division, with the rest coming from other parts of the company.

Navigation on cellphones is temporary

According to the Strategy Analytics Wireless Device Lab service report, "US Navigation: Consumers Prefer PNDs to Mobile Solutions," consumers perceive personal navigation devices (PNDs) as clearly superior to similar navigation services available on cellphones. These findings are based on in-depth one-on-one research sessions in San Diego in which consumers experienced two high-end PNDs as well as Sprint Navigation and VZ Navigator.

"Strategy Analytics research shows that consumers preferred PNDs, or factory-installed navigation systems, due mainly to larger display size and ease of use," commented Chris Schreiner, analyst at Strategy Analytics. "Consumers believe PNDs are safer to use in the vehicle."

Bluetooth

Sun shines for Bluetooth stereo headsets

IMS Research reckons that the dawn of success for Bluetooth stereo headsets is appearing on the horizon. IMS records that in 2008, over 6 million Bluetooth stereo headsets were shipped and that around 85% of all Bluetooth-enabled mobile handsets supplied in 2008 included A2DP, which is increasingly being included in other devices. Importantly, IMS suggests that the range of stereo headset models and their design features will continue to improve, and that over the next five years, the teething problems of sound quality and unattractive prices are forecast to pass.

uwb / wireless usb news



Gefen covers all wireless HD bases.

Gefen is providing end users with the ability try all the options as part of the process of choosing which wireless HD TV solution will prevail.

Three solutions from Gefen's wireless extension solutions support the delivery of high definition video with audio up to various lengths, depending on the technology used.

First we have the Wireless for HDMI UWB Extender option that uses TZero Technology's Ultra Wideband to deliver resolutions to 1080p (30fps) with digital audio 7.1 surround sound and two-channel analogue audio up to approximately 30-feet in distance. Blu-ray players, set top boxes and DVRs can connect to the two HDMI and one component video with L/R audio inputs. All three inputs deliver video in the HDMI v1.2 format with compatibility for HDMI v1.3 sources and displays. The Gefen Extender performs auto switching, giving access to all three sources from the same display or projector. Sources can also be accessed by IR back channel or by local selection on the sender unit. The product ticks all of the certification boxes too - it includes CEC (Consumer Electronic Control) support, WiMedia Alliance compliance, HDMI Forum compliance, DCP certification and FCC certification.

Then there is the GefenTV Wireless for HDMI 5Ghz Extender, which uses Amimon's 5Ghz wireless HDTV technology to deliver high definition resolutions to 1080p (30fps), 5.1

digital audio and two-channel analogue audio up to approximately 100-feet in distance. This makes it most suited for larger homes and venues. It uses small sender and receiver units that connect Blu-ray players, gaming consuls and set-top boxes to an HDTV display with no cables. HD transmission is uncompressed and HDCP compliance and HDMI v1.3 forward compatibility ensure it will work with protected content and all HDMI formats.

Finally, we have the GefenTV Wireless for HDMI 60Ghz Extender. This sender/receiver system relies on WirelessHD technology from SiBEAM to deliver HDMI at 1080p full HD, sending uncompressed video from a source to the display. The 60Ghz Extender is able to extend high definition video with audio in the HDMI format up to approximately 30-feet in distance. Uncompressed video is delivered from the source to the display with audio in digital S/PDIF format, ideal for connecting an AV receiver for surround sound applications.

Which will sell most? That will be very interesting to see.

W-USB Solutions for Linux-based and Embedded Platforms

Connectivity software solutions company Jungo has teamed with Wisair to launch an end-to-end Wireless USB solution for Linux-based and embedded operating systems used in CE devices.

The combination of Jungo's USBWare protocol software stack with Wisair's single chip Wireless USB reference designs enables OEMs to embed Wireless USB into non-Windows CE devices such as set-top boxes, TV sets, smart phones and DVRs.

Jungo's USBWare is an embedded Wireless USB software protocol stack with a small footprint that has apparently already been deployed by several Tier 1 hardware OEMs, and enables compatibility with legacy wired USB products.

Wisair's WSR601 single chip CMOS enables Wireless USB connectivity and is incorporated in a variety of reference designs, such as the Wireless USB Adapter Set that is offered by Cables Unlimited in the US and Olidata in Europe.

Jeff Ravencraft, President and Chairman of the USB Implementers Forum, said, "The cooperation of vendors from different specialties within the Wireless USB ecosystem represents a meaningful benefit to the USB community. This collaboration showcases the benefits of a standards based solution such as Wireless USB."

Snippets Bluetooth

Bluetooth scores in low-end handsets

Shipments of Bluetooth ICs in mobile handsets are expected to rise through

2013, as average selling prices (ASPs) for Classic Bluetooth ICs are projected to fall over 40% during the same period, according to IMS Research, which suggests that the forecast ASP erosion,

attributed to technological improvements and increasing economies of scale, gives handset manufacturers more flexibility with regard to including Bluetooth technology in designs for lower cost handsets.



The WiMedia Alliance: What Do We Have in Common?

by Dean Anthony Gratton

The WiMedia Alliance has enjoyed a rollercoaster ride for the last ten years or so. The Alliance was formed in 2002 and merged with the MultiBand OFDM Alliance Special Interest Group (MBOA-SIG) in 2005, now creating what we know now as the WiMedia Alliance (wimedia.org). The non-profit industry organisation is responsible for the development and maintenance, along with future enhancements, of the technical specifications that govern the standardisation and interoperability of ultra-wideband (UWB) technology (across the world). Let's be honest, you probably knew that already, as the organisation, now boasting over 350 members, has been somewhat relentless in their quest to impregnate ultra-wideband technology into personal computers and consumer electronic devices.

Ultra-wideband has had an arduous journey over its relatively short development timeframe. The ultra-wideband standard is open, like most wireless standards developed and maintained by Bluetooth, ZigBee and so on, and is openly available through licensing. The ultra-wideband standard is available to manufacturers – where these manufacturers are able to participate in the development and growth of the technology. Nonetheless, the process is occasionally fraught with pitfalls, as there will always be an endless debate on various techniques in the design of the radio, hardware and software architectures. Fundamentally, the manufacturers must agree upon an individual solution; a way forward that is adopted by the majority – a single technique that will prevail and become the blueprint from which all other manufacturers will develop and

interoperate their future ultra-wideband-enabled products.

The soap story for ultra-wideband, which originated as far back as 2003, has the happy Hollywood ending we have all come to expect. In its early days, the technology faced a dichotomy of radio modulation techniques. At the time, it was suggested that the two solutions were viable for market and could potentially coexist in harmony – WiMedia Alliance, Stephen Wood, UWB Standards, WiMedia Whitepaper, January 2008. You may all recall the story surrounding the direct

sequencing (DS or DS-UWB) modulation technique versus the Orthogonal Frequency Division Multiplexing (OFDM or OFDM-UWB) approach. The IEEE 802.15.3a task group debated for four years, where it created a deadlock amongst its contributing manufacturers – a stalemate that left the Alliance with two incompatible radio schemes – a solution that wouldn't be palatable for the end-consumer.

Notwithstanding, the Alliance chose to step away from the task group and sought an arbitrator, namely the Ecma, who would →

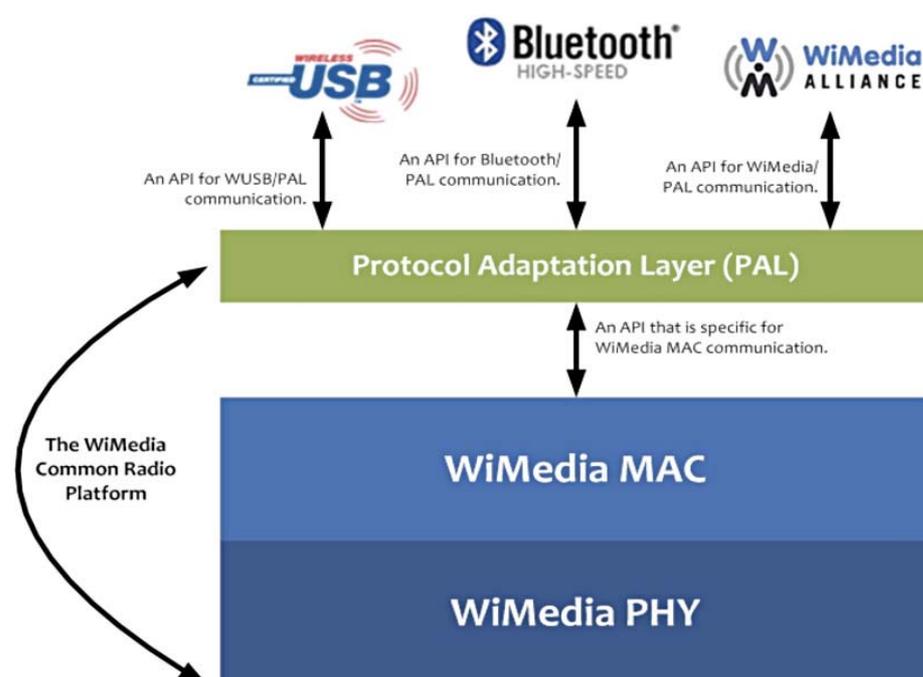


Figure 1: The WiMedia Common Radio Platform utilises the Protocol Adaptation Layer to mask the resident technology that sits on top. In turn, the technology supports effective interoperability and reduces the likelihood of interference from other neighbouring wireless technologies (abridged, courtesy of Staccato Communications).

hopefully resolve the rift between the two camps, namely DS-UWB vs. OFDM.

What's more, the respective technical marketing engines of the various big-player manufacturers initiated a charm offensive knowing that eventually there could only be one way forward.

Inevitably, the two technology camps, sitting on opposite sides, commenced an aggressive political strategy to sweeten the various key players from within opposing camps, but alas, there is only one Barack Obama (vis-a-vis OFDM). The charm ploy was clearly an attempt at saving grace, as various companies had already invested heavily in their chosen radio scheme and, of course, in what they thought was the best performing radio modulation technique.

The Ecma International differs to other standards organisations, in that it adopts a business perspective offering a simplified process in terms of defining new standards – in other words, there's very little red-tape. With two incompatible technologies, the Ecma was appointed to resolve the differences and to take responsibility for ultra-wideband standardisation. The Ecma established a technical committee, called TC20 who, in turn, permitted member companies a single vote. Inevitably, the technical committee adopted the OFDM technique as the emphatic choice for the future evolution of ultra-wideband. Consequently, the IEEE disbanded the 802.15.3a task group without a resolution – WiMedia Alliance, Stephen Wood, UWB Standards, WiMedia Whitepaper, January 2008.

As with most wireless technologies, Ultra-wideband has been plagued with varying regulatory approvals across the world – the USA, Europe, Asia and Australia have all received different time stamps on various regulations (courtesy of Staccato Communications). In some instances, the Detect and Avoid (DAA) scheme for the 4.2GHz to 4.8GHz frequency is only applicable after 2010. DAA is a technique primarily developed by the ultra-wideband standardisation committee and is used to help reduce the likelihood of interference when coexisting with other wireless technologies – this is due to it potentially interfering with WiMAX and 3G. In short, OFDM divides its spectrum (7,500 MHz of unlicensed spectrum) into 528MHz bands, where data is transmitted using the modulation scheme for each band, in turn, exploiting frequency diversity and ensuring robustness against multi-path and interference. The purported data rates for ultra-wideband range from 53Mbps through to 480Mbps.

Having established a solid foundation with a heavily debated radio scheme, the WiMedia Alliance completed an

interoperability feat in 2006, which witnessed the conception of the WiMedia Common Radio Platform (or CRP). The Common Radio Platform includes the Media Access Control (MAC) and the physical (PHY) layers, as we can see in Figure 1. The Common Radio Platform provides a coherent communication channel where the protocol adaptation layer (or PAL) rests above the WiMedia MAC layer offering an application programming interface (or API), as illustrated, for a host of wireless technologies such as Bluetooth and WirelessUSB. The PAL provides Bluetooth and WirelessUSB with a pathway that is void of interference from any other wireless technology that may occupy the same application space. Likewise, the CRP coordinates communication over the air-interface if one or more technologies reside in the software stack.

In essence, our illustration shows that WirelessUSB (Certified Wireless USB) utilises the WiMedia's Common Radio Platform to fulfil the next evolution of wireless-enabled USB devices. Certified Wireless USB is used, so as not to confuse the consumer who may see other propriety WirelessUSB devices on the market – for example, Cypress Semiconductors. The technology is capable of supporting up to 480Mbps, although it is anticipated that future revisions of the ultra-wideband and WirelessUSB standards will support up to 1Gbps. Bluetooth v3.0, although the exact revision is still uncertain, has been rumoured for some time and with WiMedia's Common radio Platform, we will surely witness the technology actually coming to fruition. Like WirelessUSB, high-speed Bluetooth will use a unique API to channel communication to and from the CRP.

WiMedia's Common Radio Platform is not limited to WirelessUSB and high-speed Bluetooth. It is envisaged that other cabled technologies will also benefit, as Wisair's VP of Marketing, Asaf Avidan concurs, "we see great benefit in enabling implementation of a wide variety of protocols over UWB, such as WirelessUSB, Bluetooth, 1394, IP and proprietary protocols for vertical markets". In particular, WirelessFirewire (1394) and WirelessHD/HDMI will undoubtedly benefit from the common radio platform – Avidan continues "The idea behind it and its biggest advantage is the fact that it enables coexistence of different protocols and application that run on top of it." The adaptability and scalability of the CRP offers incredible diversity in providing a host of complementary personal-area networking technologies all comfortably coexisting and void of interference (only if we had this five years or so ago!).

Furthermore, the WiMedia Alliance is pushing the ultra-wideband standard into UPnP and the Digital Living Network Alliance (DLNA) and no doubt we will increasingly witness a new generation of personal-area technology themes.

Obviously, WiMedia has grabbed the headlines throughout 2007 and 2008, and inevitably, it will receive further attention during 2009. The incessant debate, as to when the technology will be available, has left some manufacturers impatient. So much so that some have turned to Wi-Fi (802.11n) as a mechanism to offer their high-speed connectivity accolades. Alas, we have observed the enduring rollercoaster ride with an undulation of the "will it or won't it" mantra, but that said, the WiMedia Alliance has been meticulous in offering some kind of guarantee. The purported assurances from the Alliance have culminated into a fastidious training that will witness its very first step onto the consumer electronic stage; and in this instance, no-one wants to break a leg! We are battling our way through an economic meltdown and, as reported in Incisor's December 2008 issue, Consolidation and Funding Challenges Hit UWB Industry, there have been some casualties of funding – undoubtedly, we will surely witness a Darwinian survival of the fittest evolving throughout 2009.

Nonetheless, going back to Incisor's December 2007 issue, Ultra-wideband: A Personal-area Networking Phenomenon, we addressed how ultra-wideband would deliver on its promise, but more importantly, we described a future vision of ultra-wideband conceiving a wireless 'one-size-fits-all' technology. With this in mind, surely now, with WiMedia's Common Radio Platform, we can all agree that we have something uniquely wonderful in common.

Incisor is grateful to receive the support from the WiMedia Alliance (Stephen Wood, the WiMedia Alliance President), Cain Communications (Patrick Corcoran), Staccato Communications (Jeff Chang, VP of Marketing) and Wisair Ltd (Asaf Avidan, VP of Marketing) who all offered their invaluable insight.

wi-fi / wlan news



Broadcom claims first Wi-Fi/video integration

Broadcom believes it is the first silicon vendor to integrate Wi-Fi and video chipset platforms, paving the way for the next generation of connected digital televisions (DTVs), Blu-ray Disc players and cable/satellite/IPTV set-top boxes (STBs). Broadcom is providing consumer electronics (CE) manufacturers with a series of "video over Wi-Fi" reference designs.

With the growing popularity of in-home networks and the increasing availability of Internet-based video, Broadcom suggests that many CE vendors are adding Wi-Fi to provide easy access to digital content on video products throughout the home. Many may be a bit of an optimistic word to use at this point, but we know that companies are looking at it. Exaggeration or over-optimism notwithstanding, Broadcom went on to suggest that by providing CE manufacturers with video platforms that offer fully integrated Wi-Fi hardware and software, it is eliminating the need for complicated systems integration efforts. As a result, Broadcom claims that its customers can deliver connected products that use Wi-Fi to bring entertainment applications such as iTunes, BD-Live and Netflix to a large screen.

Like Axar, Broadcom is using 802.11n, stating that this is currently the only wireless technology with sufficient bandwidth, coverage and quality of service (QoS) for multimedia applications. Broadcom claims to have overcome the technical challenges of using wireless protocols for IPTV, providing the industry's first integrated carrier-grade solution for IP set-top boxes. DLNA gets a look-in too, with Broadcom suggesting that when combined with DLNA functionality, Wi-Fi-enabled devices provide consumers with a transparent way to access and share media between TVs, PCs, cell phones and other devices throughout the home.

There is a case to be made for saying that if Wi-Fi could wrap up all requirements for



streaming HD video, life would be simple, the birds would be singing and the sun would be shining.

Strangely, we don't think it will pan out quite that way.

D-LINK extends range with .11n tech

D-Link showed a couple of different products at CES, both of which confirmed the company's support for 802.11n Wi-Fi.

The first was an all-in-one home 802.11n Wi-Fi network router that combines network attached storage (NAS), SharePort technology for sharing printers and scanners, along with a 3.2-inch LCD monitor on the face for displaying photos, desktop applications and network performance.

The D-Link Xtreme N DIR-685's LCD screen allows users to view device status via graphical gauges, and also digital photos, streamed video, weather forecasts and other live streaming Internet content in up to 1.6 million colours.

And then there was an 802.11n Wi-Fi network camera that enables remote monitoring of live streaming video from a web browser.

The DCS-1130 802.11n Wireless Network Camera can manage networking products via a single website, providing customers, says D-Link, with an easier way to experience a connected, digital lifestyle.

Offering plug and play connectivity for easy installation and setup, the camera features mobile 3G and Web monitoring, 16x digital zoom and multiple profiles. It connects to the home or small business network using 802.11n Wi-Fi with WPS support, or via a standard network cable. D-Link is also offering a wired-only version (DCS-1100), which connects to the network when a Wi-Fi connection is not required.



With 3GPP mobile surveillance, users can view a live feed from the camera using a 3G-enabled cell phone, PDA or any compatible RTSP (Real Time Streaming Protocol) devices.

Wi-Fi networking module for My Wi-Fi PAN devices

Californian company G2 Microsystems says it is making it easier to wirelessly connect headphones, speakers and other Wi-Fi devices directly to Intel Centrino 2 based notebooks.

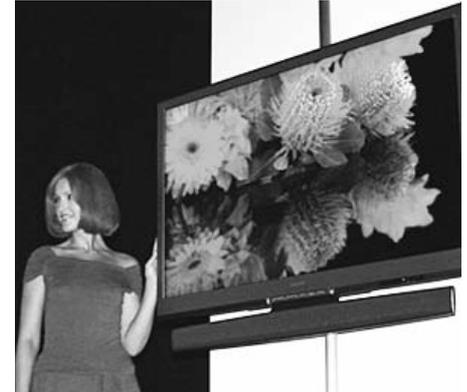
With G2's Wi-Fi networking module embedded inside, consumer devices are able to "talk" directly to an Intel My Wi-Fi technology enabled notebook, simplifying connectivity for users. For example, no more need to battle with speaker wires before you can blast your favourite tunes from your PC, or to have your headphones tethered to your laptop while you work.

By leveraging the Intel My Wi-Fi technology for Intel Centrino 2 notebooks, G2 claims that these audio devices can easily be paired with Centrino 2 based laptops, allowing digital music collections to be enjoyed cable-free, at home or on the go, giving people room to roam.

"We're showing how direct Wi-Fi access can transform the audio streaming experience, but we also envision G2 Microsystems' technology simplifying other PC-based tasks such as wireless printing and synchronization between a digital photo frame and your photo archives," said Geoff Smith, G2 founder and CEO.

The G2M5477 module is built on G2's Wi-Fi system-on-a-chip, the G2C547. In addition, G2 suggests that its ultra-low-power solutions make it feasible, for the first time, to develop alkaline battery-powered Wi-Fi devices, opening up possibilities for Wi-Fi in portable audio, home automation and health monitoring devices.

wi-fi / wlan news



Automated log-in for Wi-Fi roamers

Quiconnect claims that its new Connector software makes the whole wireless broadband roaming experience as simple as cellular, enabling service providers to “push” Wi-Fi or WiMAX connectivity to laptop users, so they avoid having to login through operator branded landing pages or input credentials such as user names and passwords.

Connector is a small piece of client software installed on the user’s laptop that can be customised to the specific branding of the wireless service provider. It detects wireless networks within range, identifies those which belong to home and office networks or public hotspot providers (and their international roaming partners) and sends a message to the user informing them that connectivity is available.

Jeff Mabe, Quiconnect’s vice president, sales and marketing, commented, “Since 2005, we’ve predominately worked at the back end integrating RADIUS servers to make it easy for service providers and network operators globally to interconnect their WLAN infrastructure to enable in and outbound international subscriber roaming. From a consumer perspective, some individual operator branding on partner websites has been added to make it easier for people to get connected, but it’s still a manual login process of going to a page, searching for one’s ISP, putting in registration details and so on. Connector removes this and automates the whole process.”

Mabe suggested that Connector provides consumers with two options in terms of how they get connected. First, they can choose a setting to automatically login to any WLAN infrastructure owned by their home service provider or those of associated roaming partners - as soon as a person is in range of a hotspot, connectivity is provided. Second, a user can select an available

network individually by clicking on the wireless network tab on their computer’s tool bar, viewing the wireless networks available and then simply choosing the appropriate SSID[1] to login.

The architecture of the Connector system includes two components: a lightweight laptop-based connection utility, comprising utility library and user interface, which allows connectivity management functions between the client device and hosted network service. The second component is a Quiconnect-hosted knowledgebase database which stores the connection policies, network parameters and roaming service availability which is provided to the connection utility to control access and provide the necessary authentication information to enable automated user login. Quiconnect’s Connector software supports various authentication methods such as WISPr[2], UAM[3] and IEEE 802.1x.

Quiconnect will be extending the functionality available today in Connector for laptops to include a Connector Mobile Edition primarily for wireless enabled handheld devices, with a release expected in the first half of 2009.

Connector is available now, supporting both Microsoft Windows XP and Vista.

Home-wide HD video over Wi-Fi

UK-based Axar Media is setting out to deliver high-definition (HD) video wirelessly throughout the home, claiming that its Axar 1000 Sender and Receiver are the only HD video over wireless products to combine standards such as 802.11n Wi-Fi and H.264 AVC, with proprietary techniques to send live TV and recorded video to HDTVs throughout the home.

The Axar devices have two inputs enabling HD video, from set-top boxes, DVRs or Blu-ray players, to be distributed over Wi-Fi. The

HD content can also be received by Wi-Fi-enabled PCs, notebooks and mobile devices.

The Axar 1000 is a self-install product targeted towards pay TV operators who want to offer a flexible multi-room solution to their subscribers, who will be able to install the equipment themselves, eliminating the need for a costly delivery/install deal.

A recent report by Informa Telecoms and Media has predicted the HDTV market will grow from 44 million households in 2008 to 179 million by 2012. As this happens, consumers will be looking for easy ways to view HD content on the proliferation of displays around their homes, and wireless solutions will be the preferred choice.

“Delivering live TV over Wi-Fi has unique constraints: you can’t simply treat video like other forms of data. The home is an extremely hostile environment for wireless signals, given the potential for interference from household appliances and other networks, so ensuring robustness has been high on our agenda,” stated Professor Andrew Nix, co-founder of Axar Media. “The breadth of expertise within Axar Media has allowed us to apply exclusive techniques to overcome the difficulties traditionally associated with video over wireless.”

Here at Incisor we are sure that we have heard industry experts saying that that Wi-Fi – even .11n – isn’t a good solution for streaming HD video. Rather than us trying to trot out reasons why and immediately making our ignorance apparent, if anybody who knows what they are talking about and wants to step in and comment, please feel free. Email vholt@incisor.tv

Having said that, Broadcom is at it too. See previous page, and also see Eric Broockman’s ‘60GHz buzz at CES 2009’ elsewhere in this issue.

low energy wireless news

LS Research launches ZigBee Smart Energy in-home-display

LS Research has teamed with Ember to develop a ZigBee certified energy monitor - Rate\$aver. This is intended to help homeowners and utilities companies to collaborate on conserving energy and reducing costs.

LS Research's Rate\$aver is a ZigBee Smart Energy-certified and FCC/IC-approved in-home-display (IHD) energy usage rate monitor. The device serves as a wireless communications portal between utility companies and their customers to provide wireless communication of consumption data from the utility meter into the home. With it, LS Research predicts that homeowners will be able to make more informed decisions about their energy usage, promoting energy conservation and helping electric utilities to reduce peak load demand.

Rate\$aver is a battery-powered, wireless graphical display employing the ZigBee Smart Energy public application profile, which supports pricing, security, simple metering and messaging clusters, and is interoperable with other ZigBee Smart Energy certified products including electric smart meters. Rate\$aver runs for up to two years on two AA batteries and uses a unique display technology that allows the display to remain visible even after the radio and the power are turned off.

"The Rate\$aver plays an important role in helping consumers manage energy use," said Benno Ritter, vice president of marketing for the ZigBee Alliance. "ZigBee Smart Energy makes connecting in-home displays to a ZigBee home area network easy and affordable. We congratulate LS Research on successfully completing our rigorous ZigBee Smart Energy product certification process."

The Rate\$aver uses an advanced radio architecture and a 100mW power amplifier that eliminates the need for repeater devices in most homes. Rate\$aver also employs Ember's bootloader capability enabling easy implementation of software updates.

GainSpan challenges ZigBee with Wipro-NewLogic low power IP

GainSpan, which develops Wi-Fi sensor network technology, has licensed Wipro-NewLogic's WiLD 802.11 Wireless LAN MAC, Modem and Radio IPs for use in its GS1010 SoC for Wi-Fi sensors.

The GainSpan GS1010 SoC is a system on chip combining a complete Wireless LAN sub-system

including the radio with an application CPU, SRAM and Flash memory plus multiple I/Os for sensor connectivity. GainSpan told Incisor that the SoC is architected for extreme low power operations and features an intelligent power management. Depending on the application, OEM products that incorporate the GainSpan GS1010 SoC can achieve battery life as long as 10 years on a single AA battery.

The WiLD IP provides a complete 802.11 Wireless LAN solution including MAC, Modem and RF (Radio technology). The IP supports both the station and the access point mode. Should it be needed, Wipro-NewLogic offers design services to customize the IP for special applications like sensor, industrial automation, defence, space among many others.

"We are delighted to enable GainSpan to utilize 802.11 WLAN technology in an application that so far has been dominated by ZigBee and other implementations of IEEE 802.15.4 standards. Using our standards-compliant IP, battery powered sensors and embedded applications based on GainSpan technology can now be deployed cost effectively, leveraging the huge installed base of WiFi networks in residential, commercial, industrial and municipal applications," said Senthil Murugesan, CEO, Wipro-NewLogic.

NFC Forum extends competition deadline

Techy types don't need much excuse to start blue-skying, but we all know that design projects over-run. The NFC Forum has extended the submission deadline for the NFC Forum Global Competition to February 28, 2009. The new deadline allows an additional four weeks for development and submission of competition entries. The competition's goal is to promote the development and deployment of NFC services.

In the competition, developers in a Commercial Track compete for the honour of having their solutions named "The Best NFC Product of the Year 2009," while a Research Track recognizes "The Most Innovative NFC Research Project of the Year 2009." Winners in each track will be awarded cash prizes. Competition entrants receive, on a first-come-first-served basis and while supplies last, an NFC-enabled Nokia phone, and a Stollmann NFCStack+Dev Development Kit with a USB Reader.

The Commercial Track is for business ideas that address a specific market, business or consumer need or want. To enter, teams must submit a business case document of no more than 3,000 words and a prototype or commercial product. Commercial entries are evaluated on commercial viability and how successfully and innovatively they meet the identified need using NFC technology.

The Research Track is open to the academic community, including university student teams and institutions. Each Research Track submission requires an explanatory abstract of no more than 3,000 words that identifies the challenge addressed and outlines the approach taken. Prototypes are preferred and multimedia presentations are welcome; entries must not have been commercially piloted previously. Research entries are judged on quality of design and their creative and innovative use of NFC technology.

20 finalists will be announced on March 23, 2009. Each team of finalists will deliver a presentation and live demonstration at the WIMA NFC Developers Summit on April 23, 2009. Following these events, the jury, composed of professionals and experts from academia and sponsoring companies, will vote to select the first-, second- and third-place winners for each track.

So go, beardy boys, go! You have another month to play with.

IBM big in RFID

IBM has been ranked at the top of the latest Vendor Matrix released by ABI Research. SAP and Microsoft claimed the second and third spots in the company's new evaluation of worldwide RFID enterprise platform BPM (Business Process Management) and SOA (Service-Oriented Architecture) solutions vendors.

"While several RFID software and solution providers promote RFID platforms, the focus of this Vendor Matrix is on those vendors offering RFID enterprise platforms backed by a BPM-SOA approach," says research director Michael Liard. "IBM leads the category, backed by its extended global reach, installed customer base and experience, and continued platform solution innovation; however, SAP and Microsoft remain highly competitive."

The Vendor Matrix is an analytical tool developed by ABI Research to provide a clear understanding of vendors' positions in specific markets. Vendors are assessed on the important parameters of "innovation" and "implementation" across several criteria unique to each vendor matrix.

For this particular matrix, under "innovation," ABI Research examined vendors' overall RFID strategy, vision, and approach as well as the scope of RFID enterprise platform solution offerings. Their industry leadership and knowledge transfer are factored in, as are their application and vertical market leadership, alignment, and innovation. Enterprise deployment-friendliness and flexibility play a role in the evaluation, along with their business process value enablement, their platform solution innovation on both BPM and SOA considerations, and their standalone aptitude and level of customization.

events



DATE	EVENT	LOCATION	NOTES	LINK
Feb 2 - 6 2009	Bluetooth UnPlug Fest 32	Fairmont Hotel, San Francisco, California, USA	-	https://www.bluetooth.org/upf/event.cfm#start
Feb 3 - 4 2009	DECT World & CAT-iq 2009	NH Barbizon Place, Amsterdam, Holland	The official event of the the DECT Forum	www.informatm.com
Feb 16 - 19 2009	Mobile World Congress	Fira de Barcelona, Spain	-	www.mobileworldcongress.com
April 1 - 3 2009	CTIA Wireless 2009	Las Vegas Convention Centre, Las Vegas, Nevada, USA	-	www.ctiawireless.com
April 22 - 23 2009	Bluetooth SIG All Hands Meeting	Tokyo, Japan	-	www.bluetooth.org
April 27 - 28 2009	2009 International IEEE Conference on RFID	Orlando, Florida, USA	-	http://www.ieee-rfid.org/2009/index.html
Oct 7 - 9 2009	CTIA Wireless I.T. & Entertainment 2009	San Diego Convention Centre, San Diego, California, USA	-	www.ctiawireless.com

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