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environment

Video enabled  Issue 113

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STEREO HEADSETS - CATCHING THE WAVE

THIS ISSUE

ANNUAL REVIEW OF BLUETOOTH STEREO HEADSETS
NEXT GEN BLUETOOTH FROM CSR
WHAT HAPPENED TO WIRELESS USB?

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in celebration of things that just work

So it has taken a while to happen, but I finally have a car that has a fully integrated, factory-installed Bluetooth system. A BMW actually – thank you for asking.

Several years ago, I had a Parrot system professionally installed in another car, and this was integrated with the car's sound system. Very nice. Or it was for a short time anyway. Soon after installing this kit, the car was sold, and the dealer forgot to do as asked, and remove the Bluetooth system before the car was sold on.

In the intervening years I've stayed legal, of course, as a result of having a constantly varying stock of standalone Bluetooth headsets. These have varied in terms of quality, usability and convenience, but I have gotten by. The trouble is, I have lost count of the times the headset wasn't in the car when I needed it, or was uncomfortable or just didn't work properly.

Now, I climb into my car, my phone synchs with the in-car system and I just drive away. If a call comes in, I press a button on the steering wheel and I can talk. I press the button again to end the call. Everything is crystal clear, and I am happy as Larry (who knows who Larry is?).

This is the way technology should work for you. It should be simple, it should be reliable, and it should just work without lots of intervention.

Vince Holton

Publisher & editor-in-chief, Incisor

INDUSTRY EXEC JOINS INCISOR TEAM

Incisor is pleased to announce that with immediate effect Steven Clarke has joined us as our Director of Business Development.

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Bluetooth Version 2.1 + EDR officially adopted

The latest version of the Bluetooth spec seems to have been with us for a while now, so it was almost a surprise when, on the 31st of July, the Bluetooth SIG announced that an adoption meeting held on 26 July 2007 has resulted in the adoption of the Bluetooth Core Specification v2.1 + EDR and Device Identification (DI) Profile v1.3.

The following major specification improvements and feature enhancements are incorporated into the Bluetooth Core Specification v2.1 + EDR:

- Encryption Pause and Resume
- Erroneous Data Reporting
- Extended Inquiry Response
- Link Supervision Timeout Changed Event
- Non-Flushable Packet Boundary Flag
- Secure Simple Pairing
- Sniff Subrating

The Device Identification Profile v1.3 specification was enhanced to integrate Bluetooth Core Specification v2.1 + EDR features.

There are general enhancements in version 2.1, too, such as Improved Pairing. The SIG acknowledges that before this version of the specification, there were many variations of the user experience when pairing Bluetooth devices. The experience depends on several factors, from the ease of finding menus on different devices to the use of security features. The improved pairing provides a consistent and intuitive pairing solution that includes finding devices, securing the link and authenticating the devices. The benefits of this secure, simple pairing include fewer

steps for the user, improved security, and connection in a few seconds.

The new pairing process enables all consumers to quickly start using their Bluetooth devices together. For example, pairing a Bluetooth headset and mobile phone is as easy as turning on the headset, selecting "Add Headset" from the phone menu, and then watching the phone confirm it has found, connected with an encrypted link and paired the headset. For pairing scenarios that require user interaction, eavesdropper protection makes a simple six digit passkey stronger than a 16 digit alphanumeric character random PIN code. Improved pairing also offers "Man in the Middle" Protection that in reality eliminates the possibility for an undetected middle man intercepting information.

NFC technology may also be used in the new pairing system whereby a user would hold two devices together at a very short range to start the quick pairing process.

The other Holy Grail – reducing power consumption, is addressed by Enhanced Power Optimization. Bluetooth Version 2.1 + EDR offers further optimised power consumption through a feature called Sniff Subrating which increases current battery life by up to five times in many devices like mice, keyboards, watches, home sensor networks and medical devices.

Executive director of the Bluetooth SIG Mike Foley commented on the announcement: "The simplified pairing process enabled by Version 2.1+EDR has received overwhelmingly positive feedback from media, analysts and member companies. This leap forward in usability further improves the Bluetooth experience and makes the technology easy for anyone

to enjoy. Also, in our effort to unite wireless technologies, Version 2.1 + EDR enables the ultra short range technology called Near Field Communication (NFC) for a pairing scenario that is as simple as touching the products together." This last element – pairing with NFC – is one on which Incisor is still seeking a bit more information. It isn't clear yet whether NFC-based pairing will become the default from this point forwards, and/or - is this in fact an option that can be implemented on some products, and not others? If anyone at the SIG wants to let us know, we will be happy to publish this to Incisor's readers.

The SIG also pointed out to its members that anyone wanting to qualify Bluetooth v2.1 + EDR devices and who were current licensees of the Bluetooth v2.0 + EDR test vectors would have a 90 day grace period starting from date of the announcement which expires on 30 October 2007 in which to acquire a valid Bluetooth v2.1 + EDR test vector license for each piece of test equipment used for testing Bluetooth v2.1 + EDR devices. After the grace period, SIG members will no longer be allowed to test their Bluetooth v2.1 + EDR devices using their existing Bluetooth v2.0 + EDR test vectors.

SIG members will get the chance to perform interoperability testing utilizing these adopted specifications at the next in the regular series of UnPlugFests (UPF). UPF 28 is scheduled for 8-12 October in Brussels, Belgium.



CSR raises the bar again with sixth generation Bluetooth silicon

It is not often that we can say that something that Incisor is reporting is actually happening as its subscribers read about it, but today – the 5th of September - it is true. CSR is launching its sixth generation of BlueCore silicon for Bluetooth.

BlueCore6 includes radio performance and power consumption that CSR describes as industry leading, as well as full support for the latest version (v2.1+EDR) of the Bluetooth specification (see announcement elsewhere in this issue). Included in BlueCore6 is CSR's AuriStream technology, which provides toll quality voice calls and is capable of a 40% reduction in power consumption in BlueCore6-ROM compared with standard Bluetooth voice transmission methods.

CSR has enhanced the RF performance to give BlueCore6 Class 1 Bluetooth range without the need for an external power amplifier. A total 11dB link margin improvement over CSR's earlier BlueCore4 (+4dBm to Tx, -7dBm to Rx) helps improve operation across the body, for example when a Bluetooth headset connects to a mobile phone worn on the user's belt.

Voice remains the key application for Bluetooth, and users continually demand higher voice quality – but also longer battery life. CSR's BlueCore6 has substantial improvements in both voice quality and power requirements. Bluetooth traditionally relies on a Continuous Variable Slope Delta (CVSD) modulation coding scheme to carry voice over a Synchronous Connection Oriented (SCO) link. CSR says that CVSD is a fairly simplistic binary coding scheme, but was selected because it is highly robust and resistant to bit errors. However, SCO does not allow for retransmission of failed

packets. Since v1.2 of the Bluetooth specification, eSCO has supported retransmissions. With AuriStream, CSR has introduced Adaptive Differential Pulse Code Modulation (ADPCM) as an enhanced voice coding method, since it performs the same function at half the rate of CVSD (ADPCM scans at 32Kbps, CVSD 64Kbps) saving up to half the Bluetooth power on the handset.

CSR has introduced a range of technologies into BlueCore6 all of which bring savings on either the Bluetooth or the host device's power consumption for mobile phone architectures. CSR has reduced the power in standby and restructured how Bluetooth devices scan for other devices.

There are two improved scan modes in BlueCore6-ROM: conditional scan and casual scan. By combining these techniques CSR says it's BlueCore6-ROM can save up to 86% of Bluetooth's power consumption in scan mode. CSR's casual scan mode synchronises the periodic wake up of Bluecore6-ROM with that of the attached baseband device, consequently Bluecore6-ROM does not wake up the host VCTXO unnecessarily.

CSR CEO John Scarisbrick commented, "BlueCore6 is CSR's most important Bluetooth silicon to date and offers more unique new technologies than any previous generation we have launched. The fact that the technologies inside BlueCore6 are way ahead of anything else on the market today clearly demonstrates that CSR continues to be the leader in wireless innovations." Scarisbrick continued, "We have already had substantial interest in BlueCore6 from key handset and headset tier one manufacturers."

Mass production is scheduled for January 2008.

[More information can be found at www.csr.com/bc6](http://www.csr.com/bc6)

Bluetooth giants race to qualify first Bluetooth v2.1 products

The Bluetooth SIG's version 2.1 adoption announcement inevitably sparked others to respond. Between them, CSR and Broadcom together accounted for three quarters of worldwide revenue from Bluetooth semiconductor sales in 2006. No prizes, then, for guessing that competition between the two companies is intense.

On the 1st August 2007, both CSR and Broadcom announced that they had qualified products to Version 2.1 + EDR, the latest version of the Bluetooth specification which was launched the day before - 31st July - by the Bluetooth Special Interest Group (SIG).

CSR reported that it had qualified its Bluetooth firmware to v2.1 of the Bluetooth specification. As well as supporting Enhanced Data Rate (EDR) of up to 3Mbps, CSR says that its Bluetooth v2.1 products offer significant enhancements to the end user experience that will make it easier to find and connect to other Bluetooth devices and then makes the connections even more secure and more power efficient.

Despite the fact that it was probably aware that CSR was announcing on the same day, Broadcom's press announcement claimed that its Bluetooth silicon and software were the first solutions to be qualified for the new Bluetooth Version 2.1 specification, and that the BCM2046 was the only Bluetooth Version 2.1 solution that supports enhanced data rate (EDR) technology and offers a high-performance Class 1 radio.

This rivalry is unlikely to end any time soon. Expect others to announce their v2.1 qualified products over the coming months.



Nokia moves to ban US import of Qualcomm products

It is amazing the venom that can be demonstrated as part of inter-industry disputes. One of the most drama-packed at the moment is the Nokia/Qualcomm spat, with an electrical storm of activity crackling around boardrooms and courtrooms. Nokia has now filed a complaint with the United States International Trade Commission (ITC) alleging that Qualcomm has engaged in unfair trade practices through infringing 5 Nokia patents in its CDMA and WCDMA/GSM chipsets. Nokia wants the ITC to initiate an investigation and to ban importation to the United States of infringing Qualcomm chipsets, and products such as handsets, containing the infringing chipsets.

The patents in question relate to technologies that improve the performance and efficiency of wireless communication devices as well as enabling lower manufacturing costs, smaller product size and increased battery life. Nokia says that these technologies are important to its success as they allow its products to have competitive advantages over those of competitors.

"There is significant evidence to warrant an ITC investigation into Qualcomm's business conduct," said Rick Simonson, chief financial officer, Nokia. "We are taking this action to stop Qualcomm's practice of copying Nokia's patented technology, without permission, and making these innovations available to its chipset customers.

Nokia is also quite open in admitting that it is following Qualcomm's own tactics by initiating legal action in multiple countries. "We are seeking the same remedies Qualcomm has sought against Nokia in multiple venues around the world," Simonson added.

Game on.

... but also stops chipset development, adopts Qualcomm strategy

At the same time as trying to ban Qualcomm products from hitting the USA, Nokia also made a pretty significant semiconductor-related announcement recently. On the 8th of August, Nokia said that it was getting out of the cellphone chip development business and was to introduce a licensing and multi-sourcing model for its chipset strategy.

Under this renewed strategy Nokia will discontinue parts of its own chipset development and expand its use of commercially available chipsets. Nokia is now working with four chipset suppliers. Texas Instruments continues to be a broad scope supplier across all protocols, Broadcom has been chosen as a supplier in EDGE, Infineon Technologies as a supplier in GSM, and STMicroelectronics as a supplier in 3G. Part of the process will see Nokia transferring about 200 ASIC designers in the U.K. and Finland to STMicroelectronics.

The announcement means that Nokia will now license its IPR to STM and any other company at prevailing industry pricing. Just like Qualcomm then. Which is rather amusing bearing in mind the squabbles Qualcomm is involved in at the moment (see above).

Nokia will however continue to develop its modem technology, which includes protocol software and related digital design for WCDMA/GSM. Nokia will then license this modem technology to its chipset manufacturers, who will use it in the chipsets they develop and produce for Nokia and - if they so decide - in the chipsets they produce for the open market.

"We believe that our renewed strategy will allow us to concentrate on developing core chipset technologies, while increasing our

R&D efficiencies and improving our agility in a fast-moving marketplace." said Niklas Savander, Executive Vice President, Nokia Technology Platforms.

The ripples of this announcement could be felt for some time.

London the setting for Bluetooth conference

IMS Research and the Bluetooth SIG will jointly host the Bluetooth Evolution Conference and Expo in London, on October 31st and November 1st, 2007.

Picking up on the challenge of how Bluetooth shipments are going to reach 2 billion annually, the conference will look at the commercial and technical impact that ultra low power Bluetooth technology and high speed Bluetooth technology will have on the wireless marketplace.

Ultra low power Bluetooth addresses devices with very low battery capacity, providing wireless connectivity for smaller devices such as watches, fitness equipment and medical related applications. The first version of the specification is anticipated by early 2008 and IMS Research predicts that ultra low power Bluetooth will not only drive the technology into new markets but propel it into tens of millions of new devices by before the end of the decade.

At the other end of the spectrum, high speed Bluetooth, which includes UWB, will enhance the current Bluetooth experience in applications such as cellular handsets, PCs and consumer electronics, especially for use-cases which involve large file transfer.

Anyone wanting more info should contact Ian Weightman, VP Conferences at IMS Research & Conferences: Email: Ian.Weightman@IMSResearch-USA.com Tel: +1 512 302 1977 or visit www.imsconferences.com



Agere quits Bluetooth SIG Promoter group

The Bluetooth SIG made an announcement this month that didn't come as a huge surprise. Agere Systems Inc. has been a long time Promoter-level member of the Bluetooth SIG, from the days when Lucent was the name of the business. The SIG's main web site explains that Promoter companies are engaged in Bluetooth's strategic and technical development of wireless technology, and that each Promoter company is represented on the board of directors.

Despite the Agere name appearing in the promoter list, and Agere staffer Graham Carter holding a position on the Bluetooth board of directors, Agere has not been in the Bluetooth business for quite a while now. Carter – a thoroughly decent and entertaining chap, it must be said – justified this board position by saying that he had been in the Bluetooth business (with Red-M before Lucent/Agere) and that his now more distant position benefited the SIG as a result of him being able to provide a detached outlook and unbiased opinion on SIG/Bluetooth matters. This didn't stop there being awkward questions at some Bluetooth events!

However, Agere was acquired in December of 2006 by semiconductor manufacturer LSI Logic Corp, and the SIG's recent announcement tells us that since the acquisition, LSI has decided not to take over the Promoter role that Agere has held within the Bluetooth SIG. As of August, Agere has officially withdrawn from the Bluetooth SIG.

This was a 'when-not-if' situation. Most SIG members that Incisor has spoken to have felt that any company on the Promoter list has to be actively involved in Bluetooth, ditto the board members.

The Agere story runs on, though, as only a matter of days later, Incisor learned that LSI Logic, which had no wireless operations of its own, was to sell off Agere's Mobile Operations business to Infineon. Seems LSI only really wanted Agere's substantial hard disk drive controller operations (which had 2006 revenues of about \$500 million) to mate with its own disk drive properties.

So what happens to Carter and Agere's body of staff in Allentown? We don't know details at this time, but word on the grapevine is that redundancies are inevitable.

In-Stat: Bluetooth - continued success, but complications loom

Research company In-Stat has been looking at the Bluetooth market and has published a series of observations. It acknowledges that Bluetooth had another successful year in 2006, and will have continued success in 2007. Mobile phones continued to be the dominant application for Bluetooth in 2006, representing over three-quarters of Bluetooth-enabled device shipments. Mono headsets and notebook PCs were the next largest applications.

In-Stat goes on to say that growth for Bluetooth devices has traditionally been fairly robust because of the popularity of Bluetooth in mobile phones. As one of the single best-selling consumer devices shipping worldwide, penetration into the mobile phone market guaranteed that the Bluetooth silicon market would see huge shipment increases annually along with falling average selling prices (ASPs). However, that growth rate is beginning to slow when compared with past years. From 2003 to 2006, the compound annual growth rate for Bluetooth-enabled device

shipments was in the triple digits. In comparison, the growth rate from 2006 to 2007 will be under 40%.

The Bluetooth silicon market is also beginning to see some market consolidation. CSR has added Wi-Fi capability over the past few years, and recently purchased two companies in the GPS business. Wireless chip maker Qualcomm purchased Bluetooth chip maker RF Micro Devices, as well as Wi-Fi chip maker Airgo Networks. Broadcom, already strong in Bluetooth and Wi-Fi silicon, recently added GPS chip maker Global Locate. The traditional Bluetooth silicon business is transitioning into a combination radio silicon business.

And this is where In-Stat believes that problems could start to arise. It suggests that this trend to radio integration is further complicated by new Bluetooth standards. In June 2007, the Bluetooth Special Interest Group (SIG) announced that it had merged with the Wibree Forum, and it would offer Wibree as a Bluetooth standard, likely to be called ultra low-power (ULP) Bluetooth.

Another Bluetooth standard on the way is high data-rate Bluetooth, sometimes referred to as Bluetooth 3.0, and based on the WiMedia Alliance's Ultra Wideband (UWB) standard. A potential rival technology to UWB has recently emerged: Wi-Fi. There is a study group within the Bluetooth SIG that is looking at the feasibility of Wi-Fi as the basis for high data-rate Bluetooth.

Though the market is becoming more complex, In-Stat believes Bluetooth chip shipments will remain very healthy for the foreseeable future. Overall, it forecasts that Bluetooth-enabled device shipments will grow at an annual rate of 23% through 2011.



Cellpoint acquires Genum's Bluetooth headset group

Incisor has learned that CellPoint, the manufacturer of the controversially styled Flamingo Bluetooth headset, has acquired the Canadian company Genum Corporation's headset group. With the recent release of the NX6000, the Genum headset group currently has 4 Bluetooth products in its portfolio.

The deal, which is a combined stock- and cash transaction, will be closed within the next 3 weeks. The stock transaction price is SEK 5,55 per stock. The stock will be issued according to the board's authorisation from the last General meeting. The purchase-price is 2,3 million CAD plus a potential earn-out of up to one million CAD.

CellPoint says that strategically this will place it at the top of the global Bluetooth headset business, enabling the company immediately to benefit from the combined product portfolio and with a joint roadmap to launch the best range of headsets in terms of comfort, design and noise cancellation technology. CellPoint's press release describes Genum's headset group as the 'leading-edge provider of extreme noise-cancellation chip technology based on the company's hearing aid DSP Platform'. Hmmm. No disrespect meant, but neither CellPoint or Genum is currently leading the Bluetooth headset industry ...

Michael Mathiesen, Chairman of CellPoint, commented that the acquisition will provide very strong support for the company's strategy to become a real global provider of high end headsets for OEM's and strategic distribution partners. "With our partners, we will try to take advantage of the millions of dollar that Genum has invested in development of their advanced headset. CellPoint will also get a boost from the 12 very experienced Genum employees, within



product development and ongoing sale, in the North American market."

CellPoints forecasts that the new organization in North America is expected to break even for the rest of 2007.

Bluetooth is making some noise in the automotive world

IMS Research believes that Bluetooth has many untapped use cases; the potential for using its functionality in automotive devices is large; however, its primary role is still handsfree calling.

IMS is apparently not surprised; the incorporation of Bluetooth for handsfree calling has been 'unhurried' in automotive products and in the OEM market, it says, and the adoption of Bluetooth has been even slower. Especially when you consider its desirability by consumers, the adoption of Bluetooth by mobile makers and legislative measures preventing drivers from using their mobile phones while driving. However IMS believes this is set to change. Although many of its potential applications are still 'unrealised', finally Bluetooth is starting to be used for music streaming as well as handsfree calling.

The launch of new infotainment platforms by car manufacturers such as Ford and Fiat has been well documented and the inclusion of wireless audio streaming in aftermarket products has increased significantly during the last 12 months.

Many in the market were astonished when Apple, the makers of the long anticipated iPhone, did not include Bluetooth audio streaming to the specification. Was this an oversight by Apple or a sign that the hype surrounding audio streaming is somewhat premature? Regardless, other device manufacturers feel very optimistic about the

promise of A2DP in cars and see this as just the beginning. Video streaming is the next big Bluetooth opportunity open to exploration by manufacturers in the not too distant future. However, we'll have to wait for Bluetooth Version 3.0 before that can be realised.

NXP shows USB audio headset solution for mobile phones

NXP Semiconductors has launched what it claims is the world's first USB-driven digital audio headset solution, Nexperia PNX0161. The new solution from NXP leverages the USB 2.0 standard to shift the core audio streaming functions to the USB connector on the host device, alongside the existing battery charging and PC synchronization functions. NXP says that this feeds the market trend for ultra-thin devices with a simplified design and a single standardized connection interface, enabling a marked reduction in bill-of-material costs and a quicker time to market.

Nexperia PNX0161 has built-in DSP software, allowing OEMs to pre-set equalizers and maximize echo cancellation for improved sound quality. Fully compliant with USB specifications, the solution offers plug-and-play operation with any USB host or On-The-Go (OTG) device and supports USB Audio and Human Interface Device (HID) classes.

In addition, foreseeing the emerging standardization of USB 2.0 in mobile devices, NXP also has a GSM/MP3 docking station reference design providing functions such as mobile phone and MP3 player power charging, FM-radio enabled speakers and Bluetooth connection.

NXP's digital USB audio solutions are available now.



Do as I say

by Gemma Paris, CSR



There is a growing need for Bluetooth-based products to incorporate speech synthesis and speech recognition technology. Bluetooth headsets and hands-free car kits, in particular, would benefit enormously from the integration of such technology. These types of products are inherently small – with minimal buttons and no visual display – and already incorporate a microphone and speaker. At present, designers deliberately constrain the functionality of such products, because otherwise the user interface would become too large and cumbersome.

Voice command and control would overcome these limitations by dispensing with button pressing, contributing significantly to in-vehicle safety and opening the way to increased product functionality. And if voice synthesis techniques could be used to provide vocal confirmation of commands, all person-to-person communication could genuinely be accomplished entirely hands-free. These ideals will soon be realized, with the forthcoming introduction of embedded voice recognition and speech synthesis technology on CSR's BlueCore5-MM single-chip Bluetooth solution.

Until now, one of the major obstacles to implementing voice command and control of products intended for in-vehicle use has been the level of acoustic noise that is present in such an environment. Remember the last conversation you had with someone using a mobile phone in a moving car? Unless they were using a Bluetooth headset with a noise cancellation algorithm, in all probability parts of the call were punctuated

by loud random noises and heavy background clutter, rendering it unintelligible to one or both parties. Filtering out this noise, without attenuating the voice signal to the point where it too disappears, is a problem that has exercised phone manufacturers for years.

The introduction of hands-free legislation initially compounded the problem, because most people who use mobile phones in cars chose to mount the phone in a holder on the vehicle's dashboard and use the phone's hands-free mode to conduct conversations – which basically involves shouting at the phone's microphone from a distance.

Wired hands-free kits provided a partial solution by placing an external microphone nearer the user, but the cable itself presents a safety issue, microphone placement is less than ideal, and the user is required to push buttons that are invariably out of sight. To a large degree, these factors drove the rapid take-up of Bluetooth headsets, which return the microphone to its rightful place near the user's mouth.

CSR's BlueCore MultiMedia includes a powerful and open DSP platform, which enables software companies to port their latest algorithms onto a Bluetooth platform. One such company is Sensory, Inc., based in Sunnyvale, California. Founded in 1994, Sensory introduced the world's first commercially successful speech recognition chip in 1995, followed by the first speaker verification chip in 1998, and has grown to become a market leader in this technology. Nowadays, the company's chips and embedded software are used in over 50

million consumer electronics products, including phones, home automation, toys, remote controls, automotive products, security systems and learning aids.

Sensory is currently developing a suite of complementary technologies and applications for CSR's BlueCore family of Bluetooth chips, and is about to port its market-leading FluentSoft embedded speech recognition software to CSR's BlueCore5-Multimedia chip. This will be the first time that speech recognition technology has been offered on a Bluetooth chip, and it will open up an entire raft of new product design and market opportunities. The technology will be made available to customers under CSR's eXtension Partner Programme, which is an open developers' forum for software processing enhancements that capitalise on the power of the Kalimba DSP in CSR's BlueCore3-Multimedia and BlueCore5-Multimedia Bluetooth chips.

Designers of Bluetooth-based headsets will at last be able to create high functionality products for the hands-free market, without being constrained by the physical demands of the products' user interfaces. Typical features could include voice dialling by name or number, call acceptance or rejection by vocal command, voice control of music playback functions, and the ability to adjust a wide variety of audio settings – such as volume, treble, bass and channel balance – without the user needing to press a single button. Furthermore, the software's integrated speech synthesis capabilities could be used to provide confirmation of users' spoken demands; in response to a "check battery" request, for example, the headset could respond with "battery level 50%".

For more details about Sensory's speech recognition software on CSR BlueCore5-Multimedia chips, take a look at: http://www.sensoryinc.com/products/bluetooth_solutions.html

Gemma Paris is Software Marketing Manager with CSR. She can be reached via Gemma.Paris@csr.com

Incisor review

Bluetooth stereo headsets

Mapping progress in an important growth area for Bluetooth

Incisor first carried out a review of Bluetooth stereo headsets fifteen months ago (see [Issue 94, May 2006](#)), reviewing three of the first stereo headset products to hit the market. These came from Motorola, Jabra and Wi-Gear. At that time we thought that these were OK, but not exceptional products. We firmly believe that stereo music is a major growth area for Bluetooth, and so it was decided that we would look again at what was available, and to see what advances have been made.

The number of headsets reviewed here rises from 3 last time to six this time. This is not intended to be a complete list of all stereo headsets available, but instead is what we were able to obtain in time for this feature to be completed. We were expecting product from Logitech, but this did not arrive, and Jabra did not come forward.

So, the players in this contest include Motorola's über-trendy S9, two headsets from Nokia – the BH-501 and a pre-production sample of the BH-604 (especially rushed in by Nokia – thanks!), an update to Wi-Gear's iMuffs headset reviewed in issue 94, and two headsets from Finnish company Iqua – the BHS-701 and the innovative BHS-801.

Our benchmark music-streaming devices were an example of Motorola's brand new, and A2DP profile -supporting MOTORIZR Z6 music phone (thanks also to Motorola), and the Motorola DC800 Home Stereo Adapter, streaming music from a PC running Windows XP and Media Player 11. All tests were carried out by one reviewer, under identical circumstances.

Each headset is reviewed independently, and we offer our conclusions at the end of this piece.



IncisorTV records consumer review panel

In addition to the written review of Bluetooth stereo headsets in this issue, Incisor is carrying out a user review panel where consumers will test and comment on all of the headset samples featured. This will include commentary on design, sound quality, ease-of-use and an overall rating for each model.

Access to the resulting video piece will be made available to interested parties as a chargeable item. This is the first in what will become a regular series of IncisorTV market research projects.

If you are interested in viewing 'Bluetooth Stereo headsets – Incisor TV consumer review', please contact Vince Holton – vholt@incisor.tv.

The vital profiles

The two key profiles for Bluetooth stereo headsets are:

- A2DP (Advanced Audio Distribution Profile): The Bluetooth profile that enables stereo sound. Both the headset and the device it connects to must support A2DP in order to hear music in stereo in the headset.
- AVRCP (Audio Video Remote Control Profile) The Bluetooth profile that enables remote control of the device that the headset is connected to. Both the headset and the device it connects to must support AVRCP in order for AVRCP to work.

Whilst support of A2DP is common to all stereo headsets, support cannot be guaranteed on all dongles. And the AVRCP profile is less widely supported. If you want to be able to remotely control functions such as 'skip' and 'fast-forward/rewind' on your MP3 player or iPod from the headset, it is important to make sure that both ends of the link support AVRCP.

[Headset reviews →](#)



Brand

Motorola

Model

Stereo Active Headphones S9

Packaging

The S9 comes packaged in an expensive looking and sophisticated black box. This uses a very complex mechanism that delivers a clear plastic tray containing the headset when you pull on a tag at one end, and automatically slides the accessories and documentation box out of the other at the same time. Very slick, perhaps a bit over complex, but certainly impressive and what you would expect of a company the size of Motorola. Hats off to Motorola – it has included the Bluetooth SIG's Experience Icons for the Headset and Music profiles on the outside of the package. Provided the consumer knows what these are, it will simplify the process of making his selection.

Accessories

Mains charger, alternative ear buds, soft material carrying pouch with draw string.

Documentation

Not supplied with this sample but readily available from the Motorola web site. The User Guide was clearly laid out, and exceptionally simple to understand. Very hard to fault.

Style/design

The S9 has lots of both. The supplied sample's orange and black colour scheme avoided the classic 'it's got to be iPod white or black', and the combination of matt and gloss surfaces was right on the button too. Unquestionably, the behind the head form factor will suit a lot of people. With its soft rubber surfaces, the S9 has a very tactile feel, a bit like a neoprene wetsuit. This is marketed as a headset for those who find themselves in 'active conditions', and is sweat and water resistant. Once the trendy set latch onto the S9, expect to see many in use in the gym or on the heads of the running crowd,

Perceived quality

Although the headset is light – lighter than most sunglasses, as Motorola says on the box – it has a solid, quality feel to it and all of the controls work with a firm click. Nothing feels flimsy. Although you could

tear off the rubber flap that covers the USB port, this would have to be a deliberate act of vandalism. Left to its own devices it should be OK for years.

Ease of pairing

With handset

Using a Motorola Z6 handset as the benchmark, you would expect the pairing process to be simple, and it was. It just paired as it should, first time. We can't make any more of it than that.

With Music player

As long as you remember to follow Motorola's User Guide instruction that you should remember to turn your phone off if you've just paired it to the S9, everything works fine. This is generic, and applies when re-pairing any of the headsets with a second device. We switched the S9 off, then powered it back up at the same time as switching the Home Stereo Adapter back on, and they paired straight away. Within moments the headset was happily playing music streamed from the PC. This IS how it should be.

In use

As with most headsets, it takes a while to remember which controls are on which side of your head. Once you have mastered this, the S9 is a delight to use. Both the call answer buttons and pause/stop/resume buttons are easy enough to find and use – they are raised and therefore easy to find with your fingers. Using the volume up/down and track skip buttons is a little more fiddly, as they are less easy to distinguish. This isn't a serious criticism – you do get used to them. When streaming audio from the cellphone and making or receiving calls, every control functioned exactly as it should. This included skipping between tracks and all aspects of call handling. When used with the Home Stereo adapter, the S9 would control all functions except track skipping. The S9 held the connection with the phone or Home Stereo Adapter well. We were able to wander between rooms without losing the signal.

Sound quality

Excellent, and leagues ahead of first generation Bluetooth stereo headsets, including Motorola's HT820, tested last time. Bass response is tight and solid, while mid-range and treble are perfectly balanced. Unlike first gen products, permissible volume levels are a little higher now, which will satisfy those needing to make their ears bleed. The S9 features passive noise-isolating eartips, and while this appears to work very well, the earbud style does allow some external sound to be heard whilst the headset is being used. This is actually handy, and most will welcome this. Overall, this is a headset that you can listen to for extended periods of time without suffering ear fatigue.

Comfort/fit

The S9 is light and comfortable to wear. We wore this headset for extended periods of

time without discomfort, and Motorola's assertion that it can be worn while working out or even running is completely accurate. On one occasion it was worn during an hour-long cross-country run and didn't slip or move around at all. With no wires flapping around and no need to constantly adjust the fit of the headset, you genuinely forgot that you were wearing a headset and instead were able to concentrate on the torture of the run. This headset is a winner for sports use, unlike the wearer.

Cool factor

This is one cool headset. Giving it a 10/10 would leave Motorola nowhere to go, so we will call it 9/10. The younger, trendier types that tried the S9 gave it an unconditional thumbs up, and more 'mature' types were perfectly happy to wear it, as it's style is discrete as well as cool – if that is possible.

Overall

Motorola lists the S9 at \$129, and in the UK we found it advertised at about £60. This is good value for a product that is very, very hard to criticise at any level. It sounds very good, looks very good, is not only comfortable but stays on your head even when you are in the middle of a serious workout. It will satisfy those needing good sound quality as well as those just wanting to look good. It is hard to imagine needing another headset.



Brand

Nokia

Model

BH-604

Packaging

We couldn't assess this aspect as this unit was a pre-production sample and was sent without retail packaging. Nokia normally does a good job.

Accessories

Again, the review sample was sent without its normal range of accessories. We did receive a soft carry bag and mains charger. →

Documentation

We were able to download the User Guide and this was clear and simple to understand. It had all the information we needed, and nothing we didn't.

Perceived quality

The BH-604 actually looks better quality than it feels, although overall it is very good. The first part of that statement may sound a bit odd, but today's computer-aided design systems allow products such as this to be beautifully styled, with colours and textures carefully judged and matched. However, when you handle the BH-604, some of the plastics are a little less solid than they look. Then you remember that this headset is set to retail at £120-140. That isn't cheap, but neither does it mean that the BH-604 should be unfairly compared with high-end wired headsets. We think that quality levels for this headset are very good in relation to its price and intended market.

Ease of pairing

With handset

Instant. Not a lot more can be said really. We did find that sometimes the handset and headset would not auto-discover each other, and it would be necessary to manually select the device in order to be able to stream music or calls to the headset.

With Music player

Remembering to switch off the phone, we powered down the BH-604, powered it back up again in pairing mode, did the same with the Home Stereo Adapter. And the two paired straight away.

In use

All the controls for the BH-604 are on the right-hand earpiece. The volume control is on an easy to find forward/reverse slider on the bottom of the casing, but the design of the arms that support the earpiece do make it a little awkward to use the button at the top to answer a call. As was proving to be the norm, when used with Windows Media Player the BH-604 does not offer track control (press the buttons and nothing happens), though the pause/stop/resume functioned. Calls were made and received while listening to music, the track cutting back in once the call was terminated.

We did have one glitch. Turning the Home Stereo Adapter off and switching to the connection to the handset, the BH-604 was left in a state of confusion, with poor quality audio being delivered. We found it was necessary to power the phone down and back up again for normal quality audio to be restored. There may be a 'Bluetooth technical reason' why you need to do this, but it is not as convenient as you would like. Once normal service had been restored, the BH-604 interfaced perfectly with the Motorola handset and everything worked as intended, including all aspects of call handling and track control.

Sound quality

This was the only headset to offer the full-size, over the ear style favoured by DJ and aspirant-DJ types. With this much real-estate to play with, you would expect Nokia to be able to fit some decent speakers into the BH-604 and it hasn't disappointed. Overall, this headset offered the best quality sound, but then it should. If there is any slight criticism, it is that bass was a little bit overdone. But this is being picky. With most Bluetooth headsets it is a lack of quality bass that is the problem.

Comfort/fit

With deeply padded earpieces and padded headband, the BH-604 is very comfortable to wear, and for as long as you might want. Although it weighs a lot more than Motorola's S9, the high levels of comfort mean that you are never really aware of it. You definitely would not, though, wear this headset while working out, but it is fine for normal in-building use, and the comfortable but reasonably snug earpieces mean you can walk around too. So, walking the pavements is OK – just don't try jogging.

Cool factor

You know how you see all those young dudes walking the streets, sitting on underground trains or sitting in Starbucks listening to their iPods on unfeasibly large, DJ-style headsets? The BH-604 will appeal to them. It's like the mega-headsets they are used to – but with no wires! Not only that, but this headset will also appeal to traditionalists too. That's quite an achievement – a headset that appeals to the fashionista as well as the pipe-smoker.

Overall

Nokia's BH-604 is a highly-covetable piece of equipment. It offers very good sound quality, is extremely comfortable to wear, interoperates with non-Nokia handsets and offers good value for money. Incisor had to return this pre-production sample to Nokia after the review was done, and it was with regret. An excellent product, and good value for money at its likely retail price of about £130..

Brand

Nokia

Model

BH-501

Packaging

Once again, we couldn't assess the aspect as this unit was sent without retail packaging.

Accessories

We received only the headset. Fortunately, we had a standard Nokia charger that allowed us to charge it.

Documentation

None was supplied, so we downloaded the



User Guide and this was a model of clarity. It would be hard to go wrong.

Perceived quality

Not bad at all, is probably the best way to sum up the perceived quality of the BH-501s. Nokia builds nice products, and retailing at around £40/\$80, this is at the lower-end of its price range. As with the big sister BH-604, the 501 (iconic number, that one, eh!) is clearly a product of today's CAD systems, blending matt and gloss surfaces and a 'bound to offend nobody' black/grey/silver colour scheme. It is considerably better built than the iMuffs, which retail for about \$100 more. And this is a simple design, with no excess of buttons or lairy graphics. A job well done.

Ease of pairing

With handset

Very simple. No problems whatsoever

With Music player

Ditto. The BH-501 and the Home Stereo Adapter auto-paired without problem.

In use

As befits its low cost, this is a simpler headset with fewer control functions. There are only volume controls and a multi-function button allowing you to answer or end calls, so no ability to be able to move between tracks when you are listening to music. How big a deal is this? Not much, for most people, we imagine. Even the more sophisticated headsets only allow you to jump forward to the next track (whatever it happens to be) or back to the previous.

Despite this simplicity, the BH-501 performed all of the functions it sets out to do quite happily. It plays your streaming music, and handles calls. The 501 held on to the Bluetooth signal perfectly well while wandering between rooms, dropping out pretty much where the others did, and resuming playing when you walked back into range.

Unlike other headsets in this review, the earpieces fold in, meaning that the BH-501 takes up less space when you are travelling. →

Sound quality

Very reasonable. For most people's listening the BH-501 will be perfectly good enough. If we have to level any criticism at all, it would be that the bass is a little in your face, and the overall sound is ever-so slightly muffled. We are being picky here. For the price that Nokia is selling this headset for, sound quality is more than adequate.

Comfort/fit

Surprisingly good. This would rank as a mid-weight product in the back-of-the-head category, and yet Nokia has gone to the trouble of designing in an extra support that helps guide the earpieces into the right position and holds them against the ears. It is this device that is missing on the iMuffs. These guides do fight a little bit with the arms of your glasses if you are a wearer, but nonetheless we regard this headset as comfortable and perfectly suitable for extended use. We're not sure that Nokia bills them as for 'the active user', but the BH-501 would stay in place if you decided to wear them for jogging.

Cool factor

Yes, this is a cool product. Perhaps the only criticism is that although the design is good, it is very like hundreds of other headsets from companies such as Sony. The big deal – that it has no wires – won't be immediately obvious. Perhaps if Nokia had been a bit more adventurous with the design (see Motorola S9, for example), kids on the street wouldn't need to go out of their way to make people aware they were using a Bluetooth stereo headset.

Overall

We like the BH-501. It looks good, sounds pretty good, and the lack of some of the extra controls is more than compensated for by the low price. If you want a good Bluetooth stereo headset, and don't want to spend a lot of money, buy this one.



Brand

Wi-Gear

Model

iMuffs MB210

Packaging

A fairly standard retail pack, with a cardboard outer, and moulded plastic inner pieces. This

pack does include a folding front flap that does include a lot of useful information about the product, including full specifications and (WiGear is to be applauded here), the Bluetooth SIG's Experience Icons for the Music and Headset profiles. All of which would be very helpful in the retail store when you want quick access to information about your prospective purchase.

Accessories

The iMuffs are supplied with a dock adapter for iPods – it is compatible with any dock-connected iPod – a travel charger and a USB cable.

Documentation

The iMuffs are supplied with a small User Guide. Like the headset itself, it looks as if it has been produced down to a price rather than up to an ambition, but for the documentation this is fine. It tells you what you need to know, in a plain and easy-to-understand fashion.

Perceived quality

This headset is a couple of notches behind others on test here. This is particularly so when you take the price into account – around \$180, which is \$50 more than Motorola's 'built like a brick outhouse' S9. The price is presumably so high because Wi-Gear is bundling the iPod adapter. This doesn't excuse the fact that the shiny plastics feel flimsy and picked up scratches very quickly, while the screen printing of the Wi-Gear branding and control icons on the plastics looks as if it lacks permanence. This was not a product that inspired confidence for a long and reliable life.

Ease of pairing

This is the only headset supplied with an iPod-specific adapter. However, for the sake of parity with the other headsets in this review, we focused on the same handset/Home Stereo Adapter connectivity. We will test with an iPod at another time.

With handset

Very straightforward. You press the volume control at the same time as switching on the headset and it goes into pairing mode. The Motorola handset found it very quickly and we were soon paired.

With Music player

The iMuffs paired straight away with the Home Stereo Adapter.

In use

All of the controls were on the right-hand earpiece, and – credit to Wi-Gear here – were easy to locate and convenient in use. The volume control in particular fell particularly easy to hand (to thumb, actually). In fact, this was one of the easiest to use headsets, with very little fumbling to find the right control button.

Making and receiving calls worked fine when we were connected to the handset. As with

the other headsets, the iMuffs were not able to control track selection when listening to tracks from the PC, but otherwise worked as they should.

Sound quality

This was variable. When listening to music, we would say it was very good – warm, well-balanced and detailed. Bass and high-end frequencies were delivered with accuracy. Unfortunately, this audio quality was not matched when making calls. Although you could hear the caller perfectly well, at the other end of the connection things were different, with low volume levels and poor audio quality. This is a headset that will require you to speak louder than you would want to, and to make efforts to speak slowly and clearly. Just like the bad old days of Bluetooth headsets. This was also a headset that you felt delivered its best sound only if you pressed the two earpieces gently against your ears.

Comfort/fit

The iMuffs are quite light, so you can wear them for extended periods without suffering head-loll. They are not uncomfortable either, though Wi-Gear's behind the head design does not sit quite so well as Motorola's or Nokia's, so you are always that little bit more aware that you are wearing the headset, and the structural integrity of your head/headset interface is not as solid as it could be. Plus, on the sample we had at least, the right-hand earpiece did not want to sit completely flat on the ear, and so you felt that you needed to keep adjusting it so that it would sit flat. We seem to remember observing the same thing when we tested Wi-Gear's first generation iMuffs.

Cool factor

Ok, so the iMuffs are aimed at the iPod user, and comes in the obligatory white or black, but iPod users are a pretty discerning crowd. Wi-Gear hasn't really raised the iMuffs up above the thousands of fairly cheap and cheerful iPod accessories on the market today. Users will appreciate the lack of wires, and will look cool from about five yards away, but if their mates want a closer look, the iMuff's quality shortcomings could diminish the cool factor quite quickly.

Overall

Wi-Gear has improved the iMuffs since the first product passed through Incisor's hands. It is to be commended for the ergonomics of the MB210, which are very good, and so is sound quality of streamed music. However, it does have some shortcomings, some of which were there 15 months ago. The truly bad audio on phone calls was a new complaint, but the questionable build quality and the less than perfect way the headset sits against your ear were there with the first iMuffs we tested. Then you factor in the \$180 price – the most expensive on test. Yes, Wi-Gear has bundled a Bluetooth dongle for your iPod, but not everyone in the world uses an iPod (Apple is trying to change this). Perhaps the iPod community will pay through the nose for the iMuffs, but we wouldn't. →



Brand

Iqua

Model

BHS-701

Packaging

This headset comes in a bubble-pack type package, designed to hang on a hook in the retail store. As such, it says 'not expensive' as opposed to 'luxury-spec'. As does its price, which is €49, so perhaps we shouldn't complain. This style of packaging works well from the retailer's perspective, but is a nightmare for the consumer, who normally has to resort to near-death experiences with razor-sharp knives to gain access to the product. And you have to destroy the packaging to get into it, which seems a bit wasteful.

This product did not include the Bluetooth SIG's experience icons on its packaging.

Accessories

The BHS-701 is supplied with no accessories, just a mains charger with a USB-style connector. According to the box, in some markets a Bluetooth dongle is included, but this was not the case with the review sample.

Documentation

There is a small, but nicely designed User Guide. This looks very comprehensive – it runs to 160 pages, but then you find that in fact it is multi-language, and instead of covering 3 or 4 different countries, it actually covers 14 different languages and any one country is covered in just a few pages – 13, in the case of the English section, for example. Most instructions are covered with a single sentence, but we didn't have any trouble getting up and running, so it must be OK.

Perceived quality

Not bad. Motorola's S9 is in a different league, but if you accept that in terms of perceived quality, Iqua's BHS-701 fits somewhere above the iMuffs (at the low end of this scale) and below the Nokia BH-501 at the quality end, then for a €49 product this is reasonable enough (and casts further shadow on the \$189 iMuffs). Not a huge amount of time has been spent on innovative or revolutionary design, but this headset at least feels pretty solidly built.

Ease of pairing

With handset

The BHS-701 paired with the handset without problem.

With Music player

Again, the headset auto-paired with the Home Stereo adapter at the first attempt.

In use

As seems to be the case with headsets tested for this review, the BHS-701 did what was expected. All of the controls for this headset were on the right-hand earpiece, and this was one of those cases where what looked as if it was going to be awkward in use actually proved to be fairly intuitive. We were quickly up to speed with all functions of the BHS-701, although the multi-function button, which you do tend to use quite a lot, was perhaps the most awkward to find when you were first getting used to the headset. You did acclimatise eventually, and overall, living with the BHS-701 was unproblematic. Although nominally about £10/\$20 cheaper than the Nokia BH-501, the Iqua BHS-701 did offer track control. Range was on a par with the other headsets.

One trick that some other headset manufacturers have missed is that Iqua has chosen to use its name/logo as the background for the traditional, slowly-flashing blue light that shows the headset is on and connected. This is a good branding opportunity, and it is surprising it is not seen on more headsets.

Another factor that worked in Iqua's favour – and unlike some of the other headsets tested – was that the headset seemed more willing to re-connect to whichever device it had previously been connected to when powered back up.

Sound quality

By comparison with most of the other headsets tested, the sound quality of the BHS-701 when streaming music seemed to reflect its position as a low-price product. Most of the other headsets exceeded expectations sound-wise, but while you would not call the sound quality of this headset bad, it was the least natural-sounding. Bass lacked depth, and there was an overall brittleness to the music reproduction that would lead to you wanting to stop listening to it after an extended period of time. Still better than first-gen Bluetooth stereo headsets, mind you, but not great. Remember the price though.

However, the same cannot be said for audio quality when making calls. For the headset user incoming calls could be heard clearly, but for the person on the other end of the line the sound quality was very poor. Maybe it is the positioning of the microphones on some of these headsets, or maybe the mics are just not good enough, but the BHS-701 falls into the same category as the iMuffs in that we could not really recommend them for use as a phone headset.

Comfort/fit

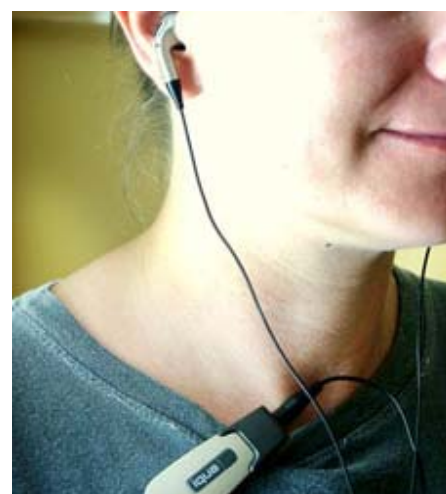
As with build quality, this headset sits somewhere between the iMuffs and the Nokia BH-501. It does not have the extra guides to hold the earpieces against the ear that the Nokia has, but at the same time it does not suffer the 'leaning away from the ear' effect that we experienced with the iMuffs. The headset was relatively light, and we feel that if you could handle the sound, you could wear this headset for as long as you want. And you could just about wear this one for working out. It was not totally secure, but with an occasional adjustment you would be ok.

Cool factor

With this headset, any element of cool was limited to the fact that it was a Bluetooth stereo headset. No other aspects of its design stood out – in a good way, that is. One element was particularly un-cool – the cream rubber inserts on the earpieces, which, on the right-hand side, housed the control buttons. It boils down to the decision to leave these sections in cream coloured rubber, which looked awfully like medical equipment and seemed almost certain to get grubby and turn yellow in no time at all. If this headset might otherwise have scored a middle of the road 5/10 on the cool scale, this one factor knocked it down to 4/ or even 3/10. What a strange decision.

Overall

This is, for the most part, an unremarkable product. It does what it is supposed to do, and it is not expensive. However, we feel that the Iqua BHS-701 needs to have the sound quality – particularly for phone calling – improved, and a bit more thought put into the design. If you just want to be able to say that you have a Bluetooth stereo headset though, this is the cheapest product that we tested.



Brand

Iqua

Model

BHS-801

Packaging

Unlike the BHS-701, this headset from Iqua →

comes in a slim cardboard box that is easy to get in and out of. Thank you, Iqua. This box takes Iqua's multi-language tendencies even further. Where the BHS-701 documentation included 13 language versions, and the box 16, the box for the 801 includes 17 languages!

Once again, this Iqua product did not include the Bluetooth SIG's experience icons on its packaging.

Accessories

The BHS-801 is a radically different style headset proposition, and its main unit is styled like a mono headset. It is supplied with two different ear hooks, an earpiece adapter, a separate wired stereo headset, a charger with a USB connector, user guide and a velvet-feel carrying case.



Perceived quality

The main headset device feels sturdy enough, and is small and light. The earhooks are – because they need to be – very flexible. The process of fitting the earhooks did leave us worrying that something was going to snap, but nothing did, and for most people this will be a one-time process anyway. The wired headset is absolutely bog-standard of its type, and could have been shipped with any one of tens of millions of MP3 players.

Ease of pairing

With handset

The BHS-801 paired straight away with the Motorola handset.

With Music player

And with the Home Stereo adapter too - this is now getting dull!

In use

This is a different proposition to all of the other headsets tested here. To all intents and

purposes, this is a mono Bluetooth headset, and can be used as such. Judged at that level, this is a simple product that makes and receives calls. However, remove the earhook, replace it with the earpiece adapter, plug in the wired headset and clip the unit to your lapel or some other location, and you have a Bluetooth stereo set-up. OK, you still have wires trailing from the ear-buds, which perhaps defeats the object, but for some people this flexibility will be much appreciated. Not everyone wants to wear a stereo headset all the time, and indeed, in many countries it is illegal to do so while driving a car. You can still listen to music while the headset is in mono mode, with the obvious loss of stereo and any serious attempt at sound quality.

One very distinct characteristic of the BHS-801 was a definite reluctance to retain a connection with the phone when you walked away from it. It lost the connection at less than half the distance of any of the other headsets tested. Whether this was down to this particular sample or representative of the BHS-801 we are not sure, but this is certainly something to be aware of.

The BHS-801 does not provide track control, but otherwise provides normal call answer/end, volume up and down and call mute/resume.

Overall, this two-way headset is a clever proposition, and it has been well executed by Iqua.

Sound quality

Sound quality as a mono headset is much as you would expect. Then, when you connect the wired headset to listen to stereo music, sound reproduction is OK, if not mind-blowing. Anyone that has used a low to mid-price wired stereo headset will be familiar with the sound quality delivered here. It is not awful but at the same time it is not great. The user buying this type of combo-headset product will probably be happy with it, and it

they are not, there are a wealth of better-quality headsets that can be plugged into the industry-standard 3.5mm socket.

What does stand out is the audio quality for people at the other end of the line when you are making a call. In our testing we found that the BHS-801 performed much better than the BHS-701.

Comfort/fit

Use the headset as a mono device, with one or other of the earhooks provided, and you are likely to feel that this is a reasonably comfortable device. Some will not like folding their ear inside the earhook, but it is not so strange when you get used to it. Once on the ear, the headset sits there reasonably stably, though it does move around a little bit. Not really suitable for joggers/gym-tastic types then.

Cool factor

We feel that the BHS-801 will appeal more to pragmatic types than style councillors. The types that do want to have a stereo Bluetooth capability, but don't want to carry two headsets around. They also won't care that when they are listening to music they still have wires dangling from their heads. The central bit of kit – the main body of the headset – is unremarkably styled and presented in drab colours. It says 'I function' not 'Look at me, I'm an exciting and glamorous piece of high technology'.

The BHS-801 is not old-fashioned or ugly - it is just, well, sensible.

Overall

There is a real place in the market for this type of device, and it will suit some people very well. Apart from its novel adaptability, it does nothing exceptionally well, and – poor range notwithstanding - nothing truly badly. It is not expensive, and we feel Iqua will probably sell quite a lot of them. So, job done, but it's a shame it wasn't done with a bit more design flair.

Bluetooth stereo headsets - the winners and losers

In an advance on the situation that existed when we first tested stereo headsets, there are no real losers here. Perhaps the headset that disappointed most was Wi-Gear's iMuffs. This is the most expensive headset we tested, yet it looks and feels the cheapest and performed very poorly for voice calls.

Iqua's two headsets show that here is a company that is pulling above its weight. Both the BHS-701 and BHS-801 are decent products, and the BHS-801 in particular is notable for its switchable personality. If only it looked cuter!

In this shoot-out, the battle for best headset turned out to be between Nokia and

Motorola. Yet, even then, it wasn't that simple, as neither of the two Nokia headsets reviewed was a direct competitor for Motorola's S9.

The Nokia BH-501 is our selection as best, low-cost Bluetooth stereo headset. It performs well, looks and feels good and is comfortable to wear. And it really doesn't cost much money.

At the high-end there is the Nokia BH-604. This is the battle-cruiser of Bluetooth stereo headsets, and even though this was a pre-production sample, it blew us away with the sheer audio quality and by just how comfortable it was to wear. Motorola sells a

similar product – the S805 – but Incisor has not tested this so far. So, at the moment, the Nokia BH-604 takes the award for the best-sounding, high-end Bluetooth stereo headset.

And yet Scarcely any distance behind the BH-604 in terms of sound quality is Motorola's S9, which is remarkable given its tiny earbuds. The S9 performs superbly on all levels, and offers something that none of the other headsets get close to – truly different, innovative and stylish design. In our opinion, the S9 moves the Bluetooth headset market on by the same sort of quantum leap that Motorola's original RAZR cellphone did the handset market. →

So, our overall selection for best Bluetooth headset is the Motorola S9. This is an exceptional product, and at \$129/about £60, represents very good value in today's market.



Footnote:

It may have occurred to you that we haven't really had to criticise any of the products tested for their Bluetooth performance. Pairing of all products was extremely simple, everything streamed music OK, handled the making and receiving of phone calls, and nobody's product had a problem working with anybody else's product.

It now comes down to looking at who's product achieves best sound quality and who has put most effort in design and ergonomics – and, of course, building them properly and pricing them sensibly.

This is excellent, and a sign of real progress.

The Bluetooth industry is to be congratulated for achieving this level of reliable functionality and interoperability between products.

And one last point: Incisor did not test the full battery life capability - talk-time and music streaming - of these headsets - there simply was not enough time. With much-improved battery life, partly as a result of improving Bluetooth power consumption and also because these headsets generally have enough space to accommodate decent size batteries, all products reviewed offered more than adequate play/talk-times. In fact, it will virtually always be the case that the handset (any handset) will need re-charging before the headsets do.

Stereo Bluetooth headsets - technical specs, pricing and availability

	Iqua	Iqua	Motorola	Nokia	Nokia	Wi-Gear
Model designation	BHS-701	BHS-801	S9	BH-501	BH-604	iMuffs MB210
Headset style	Stereo Headset	Stereo Headset	Behind-the-head street/sport style	Neckband, over the ears	Headband, over the ears	Behind-the-neck
Colour variants	Orange and silver	Champagne and silver	Red/Black / Black	black/silver & white/silver	n/a	Black, White
Battery life:						
Music streaming	Up to 10h	Up to 8h	6	11 hours	19h	16 hours
Talktime	Up to 12h	Up to 10h	7	11 hours	18h	
Standby	Up to 350h	Up to 15h	150	150 hours	2 weeks	
Battery type	Li-Polymer battery	Internal rechargeable battery 120mAh	Lithium-Ion	260 mAh Li-Polymer	500 mAh, Li-Polymer	Li-Polymer
Charging time	Within 3,5hrs	Within 2hrs	2 hrs	4 hours	Less than 1,5 hours	5 hours
Charger type/s	Wall charger 1 - 5V 350mA Mini-USB 5pin	Wall charger EU 5V 350mA (MFR: SIL Mini-USB 5pin)	Mini USB	Nokia AC-5 or or other chargers compatible	Nokia AC-5 or or other chargers compatible	AC Adapter / USB port
Spec / Class 1 or class 2 Bluetooth?	Bluetooth spec.1.2	Bluetooth spec.1.2	Class 2	v1.2	v2.0 with EDR	Class 2
Connectivity/Profiles supported	Point-to Point	Point-to Point	HS/HF, A2DP, AVRCP	HFP, HSP, A2DP	A2DP, AVRCP, HFP,HSP	A2DP, AVRCP, HFP, HSP
Paired devices	up to 8, one at the time	up to 8, one at the time	8	8	8	2
Security	standard bluetooth encryption	standard bluetooth encryption	Security Mode 3	encrypted link	encrypted link	
Other features (e.g. noise canc.)			Passive noise isolating ear tips		Advanced DSP, EDR, HiFi audio quality, 40mm audio speaker drivers, fast charging	Echo/noise cancellation on microphone
Weight	83g	12g (with earhook)	1.14 oz	68g	250g	Headphones 2.2 oz
Dimensions	140x166x53mm	62,5x25x13mm	126 x 130 x 48mm	140 x 115 x 50 mm	190 x 180 x 75 mm	6.4" x 5" x 2.2"
Available now?	Now	Now	Yes	yes	n/a	Yes
Available globally?	Now	Now	Yes	yes	yes	US only
When launched?	Dec-06	June 2007	Feb-07	3Q 2006	3Q 2007	2006
Warranty	12 months	12 months	12 months	12 months	12 months	12 months
Sales package contents	Stereo headset, wall charger, user guide, quick guide, Bluetooth dongle (market dependent)	Stereo headset, 2 earhooks, stereo earpiece, earpiece adapter, wall charger, carrying case, user guide, quick guide	Manual, replacement ear tips, charger, Quick start card, Bluetooth experience card	Nokia Bluetooth Headset BH-501, Charger AC-3, User Guide	Nokia Bluetooth Stereo Headset BH-604, Travel Charger AC-5, carrying pouch, user guide	iMuffs Wireless Headphones, dock adapter for iPod, travel charger, USB cable, User Guide
Price	€ 49	€ 89.00	\$129 / € 100	€ 65.00	€ 120 - € 140	US\$179.99 including iPod adapter / € 150

new products



Nokia N95 – the Swiss Army penknife of cellphones

Nokia's N95 handset – or multimedia computer as Nokia prefers to call it - has been voted 'the European Media Phone of the Year 2007-2008' by the European Imaging and Sound Association (EISA).

Commenting on the award, EISA praised the Nokia N95 as containing "practically every feature one could imagine in a mobile device." Additionally, the award citation of the EISA jury goes on to say: "It's no mere mobile phone and no mere status symbol. Pick up a Nokia N95 and you hold in your hands a state-of-the-art communication tool - the ideal way to remain permanently in touch and on track with the world that surrounds you."

The judging panel cited Nokia N95 features such as Bluetooth, Wi-Fi, GPS, 5 megapixel camera with Carl Zeiss optics and MPEG4 video capture of up to 30 fps. EISA also highlighted the device's web browser, microSD slot, and audio reproduction of multiple audio formats.

"The Nokia N95 has evidently raised the bar for mobile devices and we are thrilled to receive this accolade from consumer electronics magazines across Europe," said Jonas Geust, head of Nokia Nseries Players Category, Multimedia, Nokia. "This award is an endorsement of the strategy behind Nokia Nseries - to bring to people's hands high performance multimedia computers which make digital convergence a reality."

A Nokia N80 has been used as a benchmark in the Incisor office for some time. An excellent phone it is, too, and many, many of the pictures used in Incisor have been taken using its



stunningly-capable 3.2 megapixel camera. Our only criticism centres around battery life. It should last longer (although the battery hasn't burst into flames yet – topical joke). Oh, and it's a bit big/heavy.

So, with added GPS and a 5 megapixel camera, the N95 ought to be entirely worthy of EISA's award.

Arizona disty picks up Case Logic Bluetooth products

DBL Distributing, a Scottsdale, Arizona-based wholesale distributor of consumer electronics products, has signed an agreement to distribute the Case Logic cellular accessory line, manufactured by Bytech Inc, including a collection of Bluetooth products in varying colours. The Case Logic brand first launched its Bluetooth headsets at CES 2007.

The new products are described as 'a cross between functionality and fashion' for the cellular accessories segment. The Case Logic Bluetooth headset with vibrating holster features a "power bank"/holster to store and charge the headset that vibrates with incoming calls, said to be a bonus for automobile travel. The design incorporates an extended mic that hugs around the cheekbone. Also available through DBL is the standard CLBTH-10, claimed to be the ultimate comfort in Bluetooth headsets. No ear hook is necessary as a soft material settles in the ear for comfort and secure holding. For the fashion conscious, this model offers additional faceplates in varying colours. Additionally, DBL will carry Case Logic's stylish leather cellular cases and cellular chargers. All cases are made with either a durable nylon material or genuine Napa leather.

Case Logic's full line of cellular accessories are included in DBL's new Spring/Summer catalog.

Breaking the Bluetooth Code:

ADPCM voice coding proves that taking your time is not always a bad thing

Most handset makers today list Bluetooth as one of the most salient points in their product descriptions. More and more countries and regions around the world are rolling out legislation forcing users to make use of handsfree kits or headsets if they wish to take or make calls whilst driving; Bluetooth presents the ideal wire-free solution to this, hence the trend is that more and more handsets must include Bluetooth technology. Wearing a Bluetooth headset whilst walking around town is also increasingly socially acceptable and is also serving to boost the attach rate for Bluetooth in phones. The attach rate continues to increase year on year, with more headsets supplied in the box ('bundling') with mobile handsets also helping operators and handset vendors to differentiate their offering. All of these trends point to one thing: the growing dependency on Bluetooth for voice calls.

As the use of Bluetooth headsets grows, users are also demanding that the quality of the voice signal is nothing less than toll quality (as good as a fixed line phone call). So, with pressure to enhance quality of voice signals, and with constant downward pressures on power, this article looks at one of the ways Bluetooth technology is adapting to address these issues.

The challenging environment for voice in Bluetooth

Information 'data' sent across a Bluetooth wireless link comes in two basic forms: asynchronous data, and synchronous voice. Asynchronous means the information does not need to be sent in a constant stream of data – as long as all of the data arrives at the destination, and is reassembled into the original form (e.g. an image) it is not sensitive to the image data being subdivided into bits of data, and sent as and when the Bluetooth link is quiet. When it comes to voice traffic, users will not tolerate parts of their conversation arriving at different times, or their speech broken up. Smooth and real time information (streaming audio) is essential for useable voice connection.

With this in mind, Bluetooth was designed to support both types of air interface: the Bluetooth specification includes ACL (Asynchronous Connectionless) packets to support data traffic, and SCO (Synchronous Connection Oriented) packets for voice traffic. SCO is circuit-switched, it has symmetric synchronous services and has



slot reservation at fixed intervals, making it suitable for time critical data such as voice. The Bluetooth specification also supports three simultaneous voice channels (SCO links) per master device.

Voice channels use the Continuously Variable Slope Delta (CVSD) voice coding scheme and SCO defines that packets are not retransmitted. The CVSD CODEC was chosen for Bluetooth because of its robustness in handling dropped and damaged voice samples. Rising interference levels are experienced with increased background noise: even at bit error rates up to 4 percent, the CVSD coded voice remains acceptable.

This delta modulation scheme follows the waveform where the output bits indicate whether the prediction value is smaller or larger than the input waveform (in binary terms a one or a zero to signify a change in the value). To reduce slope overload effects of this fundamentally binary approach, syllabic companding is applied: the step size is adapted according to the average signal slope. The input to the CVSD encoder is 64k samples/second linear PCM.

Version 1.2 of the Bluetooth specification sought to address some of the limitations of SCO connections: SCO's uplink and downlink bit-rates are fixed at 64Kbps and there is no provision for retransmission of packets. Bluetooth v1.2 introduced Extended SCO (eSCO) transport which provides for retransmission of corrupted packets; this can increase the transmission quality of SCO

transfers which is important in connections where transmission quality is not necessarily a "binary issue"; for example, transmission of audio or video data. However, in spite of Bluetooth now supporting a retransmit function, Bluetooth voice packets still continued to be coded with the default CVSD coding system. This leaves room for improvement in the way voice traffic is handled.

As an example, in its sixth generation of Bluetooth technology, CSR has addressed the limitations of CVSD as a coding method for voice traffic, and introduced improvements to the RF (specially to the scan techniques) to improve sensitivity and transmit power. To the added benefit of the handset maker, these radio enhancements have also brought substantial power savings.

By adding a PCM-based coding technique to Bluetooth, it is possible to reduce the data rate required for voice and audio traffic, and boost the potential capacity, or to greatly reduce the power required by the Bluetooth system. Bluetooth silicon market leader CSR addressed this in its BlueCore6 product range, which launched in September 2007.

The most important development, named AuriStream™ by CSR, uses the Adaptive Differential Pulse Code Modulation (ADPCM) CODEC over eSCO to achieve much higher audio quality, and power savings of 40 percent compared to a CVSD coded signal over a standard SCO connection. As Bluetooth headset usage continues to increase, longer talk times →

are essential for business users on long journeys, or on important conference calls.

ADPCM is a well-known and widely accepted CODEC that provides an ideal complement to CVSD. The latter handles bit-errors and so overcomes the lack of a retransmission capability in Bluetooth that relies on SCO packets for voice. However with eSCO's ability to detect errors and retransmit packets, it is no longer necessary to depend on CVSD.

ADPCM differs from CVSD in that it samples slowly and it sees the differences between the samples. ADPCM carries fixed line quality signal at a slower rate of 32Kbps (instead of 64Kbps with CVSD) so the Bluetooth transmitter and receiver operate for approximately half the time. In CSR's tests this approach is proven to save 40 percent of the power of the Bluetooth system compared to the CVSD coding technique used in all other Bluetooth systems.

In terms of assessing the level of audio quality, Mean Opinion Score (MOS) is an accepted ITU-T measure of audio quality where 1 is the lowest

and 5 is the highest quality (according to the ITU, a score of 5 is impossible). A CVSD coded voice signal at 64Kbps (no retries permitted) scores 2.46 on the MOS scale; an ADPCM CODEC at a bit rate of 32Kbps (with 2 retries allowed) notches up a MOS of 4.14. To put this into more tangible terms, the shift to ADPCM brings a voice call across a Bluetooth connection up to toll quality (that means it is as good as a wired phone).

ADPCM coding brings other benefits related to its quality. Voice dialling with a Bluetooth headset enabled by CSR's BlueCore 6 with AuriStream connected to a cellphone (also using AuriStream) becomes more accurate and operates much easier in noisier environments.

Because CSR's AuriStream in BlueCore6 supports ADPCM at 32Kbps (half the 64Kbps data rate of CVSD) there is potential to support a lot more voice channels. CVSD would traditionally support three simultaneous SCO voice channels. It is likely that an ADPCM at 32Kbps link using Bluetooth Enhanced Data Rate (v2.0 or v2.1 of the Bluetooth specification,

with data rates up to 3Mbps) would potentially support up to seven much higher quality eSCO channels, although today the Bluetooth Specification states three.

CVSD is still supported when the Bluetooth device needs to connect to an existing Bluetooth product which does not benefit from CSR's AuriStream. CVSD is still mandated in the Bluetooth specification and currently only products designed with BlueCore6 benefit from CSR's AuriStream technology with ADPCM. BlueCore6 will fall back into CVSD coding when connected to non AuriStream-enabled Bluetooth devices.

The Bluetooth specification provides a solid foundation for voice communications. However, designers who are looking to deliver the maximum voice quality to their products need to question whether employing technologies such as CSR's AuriStream with ADPCM coding may bring them closer to their objective.

For more information, visit: www.csr.com/bluecore6

Analysis

Is 3G coverage about to get better?

By Manek Dubash



This week sees a decision that could lead to wider access to mobile data.

The European Commission has decided to reallocate parts of the radio spectrum used for 2G services and use by 3G services. The process is known in telco-speak as 'refarming', and will, according to the operators, open up 3G services to 300 million more people in Asia, Europe and Africa.

This move has come about as a result of the growth in the use of 3G, which operates at higher frequencies than good old 2G, or GSM, which of course works at the familiar 900 and 1800MHz ranges. This uptake of 3G has been at the expense of 2G radio spectrum usage, a reduction that's freed up capacity. And apparently there's enough spectrum going spare to make it worthwhile loading it up with 3G services.

It could result in better 3G coverage, not just because there's more spectrum available, but also because the radio frequencies used by 2G propagate much better than standard 3G spectrum, which operates today at 2100MHz, significantly higher than 2G.

As with anything involving basic physics, you don't get something for nothing, so the greater capacity allowed by 3G's higher radio frequencies is offset by the fact that such frequencies need line of sight access and don't penetrate objects, such as walls, hills and trees, very well. It's the reason why the 1800MHz mobile phone signal isn't good in hilly rural areas. But it's better than 3G's patchy 2100MHz coverage, while the 900MHz coverage is near-universal.

As a result, the operators could gain higher revenues in rural areas where 3G hardly works at all, as a result of their initial concentration on lucrative urban areas when building out the 3G networks.

The refarming process would also help the operators fend off the challenge from WiMax and other fourth-generation mobile technologies. The only downside, according to one analyst, appears to be the possibility of radio interference through greater use of the spectrum.

Other than that this looks like that rare thing indeed: a win for operators and users alike.

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

Network Weekly is a weekly round-up of networking, telecoms and storage news.

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Snippets

Life just gets worse for Qualcomm

A federal judge has increased the amount of damages Qualcomm must pay to Broadcom in their patent dispute to \$39.3 million, citing the intentional nature of the infringement.

In June, the International Trade Commission (ITC) banned imports of new, high-end phones that run on Qualcomm chips, raising doubts about the introduction of some models from carriers including Sprint Nextel Corp. and manufacturers like LG Electronics Inc. and Samsung Electronics Co. Now, the Bush administration has rejected an appeal by Qualcomm, and upheld the import ban on cell phones that contain Qualcomm chips, further threatening the introduction of new handsets.

Qualcomm said it will ask the U.S. Court of Appeals for the Federal Circuit in Washington to reverse the ban and put it on hold while its appeal is considered.

Incisor interview

What happened to Wireless USB?

Incisor talks to Staccato Communications



Mark Bowles, Staccato Communications

We're probably all familiar with 'the question you don't want to answer'. As kids it was 'weren't we supposed to see your report card this week?' or 'what do you mean - you were carrying that pack of cigarettes for a friend?' Questions like this make you squirm, and you'd rather be somewhere - anywhere - else rather than have to answer them. It happens to grown-ups, too, for all sorts of reasons, and not just related to personal misconduct. Many people in the UWB/Wireless USB industry have been visibly flinching when the question 'what on earth has happened to wireless USB?' is asked. Or they've headed for the door when they thought the question was about to be asked.

The amazing benefits of wireless USB have been promoted for approaching two years now, with a number of companies making announcements and showing prototype demo equipment at CES in Las Vegas back in January 2006 (see pages 20/21, [Incisor issue 91](#)). At that juncture we were promised products in retail stores by the end of 2006. That didn't happen. Incisor published a special issue dedicated to wireless USB in February this year - the [video-enabled Incisor issue 105](#) - where the WiMedia Alliance and some of its most active members gave a detailed overview of the state of the market. Product availability was just around the corner.

Now, another 9 months on, it still hasn't happened. Icron technologies, an early trailblazer, may be getting closest. Formerly a partner with Freescale Semiconductors, and planning to use Freescale's Cable Free USB take on UWB technology, Icron has since switched to using 802.11g as the transport mechanism for its first ExtremeUSB solutions. Device manufacturer Gefen has announced a product based on this (see [p15 Incisor issue 111](#)). However, requests for review samples have been unanswered so far.

Light at the end of the tunnel?

Things may be changing. As recently as

last month, Incisor covered the announcement that the first six wireless USB products had been certified by the USB Implementers Forum (USB-IF), with Dell, D-Link, IO Gear and Lenovo announcing products that will proudly wear the Certified Wireless USB logo. But we still can't buy them today.

So, why these extended delays? Incisor sought the views of two of the UWB industry's straightest talkers - Mark Bowles, who is Founder & Vice President of Business Development & Marketing at Staccato Communications, and colleague Jason Ellis, Director of Business Development. Staccato is one of the leading companies in the UWB and Wireless USB industry.

What went wrong, we asked, and why are we still waiting for wireless USB - in any shape or form? Bowles put his hands in the air and immediately admitted that the whole industry had underestimated the time to market for wireless USB. "Sincere, experienced people expected wireless USB to hit the streets nine months ago. Well before then, even the worst-possible scenarios weren't suggesting that we would still be waiting now."

Bowles went on to talk through some of the challenges that had had to be faced.

"As a base point, this was not an easy radio to build. It's a very low power device. This has been done now and the PHY, MAC and the software are all done. The radio was actually certified a year ago." So why the extended delay, we asked? "The amount of time needed to get the protocol level software running on the MAC was underestimated," commented Bowles. "The most complex task was getting the Wireless USB Host Wire Adapter and Device Wire Adapter (HWA/DWA) to work, and this was given priority over everything else. It took a long time. At first, things were made to work at 10Mbps, then 10-20Mbps, and then we were shooting for 100Mbps. The reality is that we are optimising for 50-70Mbps, though the HWA/DWA will be limited to 50Mbps. As time goes on, other protocol implementations will achieve over 200Mbps."

Apart from the slowness of the HWA/DWA development, there were also other glitches, Bowles explained. "There were also regulatory issues, and particularly issues relating to the use of the upper and lower UWB bands. These proved too much for some companies, who have abandoned plans to be in Band 1, and are now going straight to the stage where wireless USB will be embedded in devices, and in Band Group 3 - this is



particularly true of the companies looking to put wireless USB in cameras.”

Nothing without control ...

Apart from the pure mechanics of inventing things and then making them work, there is another factor. Different technologies have been allowed to come to market with greater or lesser levels of control over the roll-out process. In the early days, for example, the Bluetooth SIG allowed itself – or some of its members, at least – to get a bit carried away with the significance and commercial potential of the technology. This resulted in over-hyping, and some press and analyst negativity when products either failed to materialise when promised, or not to work perfectly in the very early stages. The SIG saw the error of its ways and clamped down. While the market may have wanted product NOW, the SIG saw to it that the rest of the Bluetooth roll-out process happened in an orderly and controlled manner. Things haven't been the same everywhere. In the world of wireless LAN, as each new – faster – version of Wi-Fi has been developed, many companies have rushed pre-certification products out early to grab market share, and this has leant an air of disorder and lack of control, resulting in worries at consumer level about interoperability and the ability to be able to get support. One body, according to Bowles, prevented this happening with wireless USB. “Intel was very concerned to protect the USB brand as it transitioned to wireless USB, so it (Intel) made its influence felt, holding back the wireless USB steamroller until things were working well.” Intel is a major player in the USB-IF, and Intel staffer Jeff Ravencraft is president of the USB-IF. Well-positioned to manage developments, then.

Managing expectations

Now that most of the difficult stuff has been done, where does wireless USB go from here? Will it all be plain-sailing from now on? After all, the first place new technologies head when products hit the streets is the so-called ‘trough of disillusionment’. It's quite understandable that companies want to be first to market, but whether it is wireless hubs, phones, radical new cars or washing machines, it's a fact that things don't always work perfectly at the outset. Consumers get disappointed, the press throw stones, and the technology suffers a setback. What separates the technology men from the boys is whether they can ride-out this period, and recover to enjoy long-term adoption and success.

What did Bowles think were wireless USB's chances of doing this? “In the early days of UWB, people were at least

realistic in their expectations. However, it is true that even before products were out there, there have been people asking why we need wireless USB? Others have been positive. My feeling is that there will be some issues for a while, such as glitches in the user interface. Once these have been filtered out - a process that will probably take about 6 months - it won't be long before wireless USB is climbing out of the trough of disillusionment. Generally, this is one of those technologies that, once you use it, you can't live without it. “

Wireless USB – between Bluetooth and Wi-Fi

There are five or six areas that have been identified as the early applications for wireless USB. These are dongles, the hubs to go with those dongles, PCs, hard disks, cameras and printers. What will attach rates be like, we wondered? “Somewhere between Bluetooth and Wi-Fi,” suggested Bowles. “Wireless USB is a little easier to forecast than Bluetooth, which replaced nothing, and so nobody really knew whether people would use it or not. The big question today is – of the hundreds of millions of Bluetooth nodes out there - how many are switched on and being used? Wi-Fi is different. A very high percentage of the devices that have Wi-Fi onboard are actually using it. My view is that wireless USB will be somewhere between these two, and that there will be a ‘got to have it’ attitude.”

When is talk time?

After much early publicity the UWB/wireless USB industry has gone very quiet. Over the last 6-12 months, publications such as Incisor have been forced to speculate about developments within wireless USB. Why so? “Once you have let the world know that there is a new technology, and that you are part of the community that will bring it to market, there is not a lot that you can say until your product has been finished and certified, and/or you can announce that you have done deals with significant customers,” said Bowles. “Staccato, like all of the major players, has been in that hinterland. This situation is about to change. The certification and customer win announcements are coming. What's more, new usage models are being discussed - an application involving Wireless USB and TV in Korea, for example. There will be much more publicity before long.”

One of the reasons that Staccato will be able to make a noise is that it is well on the way to announcing its second generation UWB product. Staccato was the first of the UWB companies to blaze the single-chip all-CMOS trail. Its Ripcord family, which is behind Staccato's

wireless USB developments, uses 110nm digital CMOS process technology, and although Bowles wasn't giving any secrets away, Incisor believes that the company is not far away from announcing a second-gen product based on 65nm technology. How confident does this make Bowles? Very, it seems. “This time next year the UWB and wireless USB market will be all about single-chip, all-CMOS. Staccato already has a single-chip solution today, and therefore has a healthy lead.”



“Only two of the other leading UWB companies – Wisair and Realtek – are in the single-chip market. Both are still at first generation, with Wisair yet to get its solution productised. Realtek has been working on UWB for a long time, and did execute its first-gen product a little faster than expected. Other companies, such as WiQuest and Alereon, currently have no roadmap to single-chip. This all puts Staccato firmly in the lead, and makes me very confident of our roadmap.”

Consolidation around the corner

Bowles' words lead us to start to speculate again. With any new technology there is a rash of interest from companies wanting to jump on the bandwagon. As time goes by, there tends to be some fall-out, with companies either deciding to allocate their resources where there is a better chance of success, or otherwise the company will burn any initial money it has from the venture capital market, only to then fizzle out and disappear. There seemed to be an indication from Bowles' observations that the UWB/wireless USB market could be reaching this stage. Was this true? “What is currently a 7-8 company game is really only a 3 company game,” suggested Bowles. “The fall-out could start pretty soon. As a company approaches its next round of funding, and if it is lagging behind the industry, it gets harder and harder to raise the money it needs to stay alive. I think that within 12 months, some of the current players in the UWB market will be gone.”



Interesting. And for those companies that remain, where will most business come from? Will it be the cellphone industry, which, with its huge unit sales volumes has - and still does - underpin Bluetooth's sales success? Not according to Bowles and Ellis, who believe that sales initially will come from other markets. "The PC sector, and hubs and dongles, will be where some early sales are made, but it is the embedded market that Staccato is focusing on, and where we believe the most interesting and rewarding work is to be done." Bowles believes that there is huge potential for embedded wireless USB in mobile devices such as cameras, and across a wide range of consumer electronics products. Nevertheless, if you expected wireless USB in your next handset, you are likely to be disappointed. Be patient, though, because it will come. "The embedded market does of course include cellular handsets, but Staccato believes that take-up in this area will not happen until after the earlier adoption in PCs and consumer electronics products. It is likely to be 2009 before we see even modest adoption by the handset companies, and 2010 before it takes off."

Sufficient capacity?

Despite extensive delays, it seems that the wireless USB revolution is coming after all. There's just one final thing to consider. It occurs to Incisor that at this stage in the development of Bluetooth technology, there were still many more companies vying for prominence. We would estimate that there were 12-14 companies looking to produce Bluetooth chips at the same point in the Bluetooth roadmap. With nominally 7-8 companies today competing in the UWB/wireless market, and with this number quite likely to decrease over the coming 12-24 months, it does make you wonder if there is going to be sufficient capacity in this part of the semiconductor industry when the OEMs/OEMs start writing big purchase orders. Today, none of the semiconductor giants is involved. Freescale is out, and TI, Broadcom, NXP and others all seem to be playing a watching game. CSR has pledged its support, but appears to be holding back.

As we concluded the interview, we put this point to Bowles. "I think the summary of the situation is very good, and the point you are making is mostly accurate. You might want to consider that NXP has been demonstrating a solution publicly for a while and recently announced a huge investment in developing chips out of their Singapore division. They have been pursuing a single chip CMOS implementation for at least 18 months so they may intersect the market fairly quickly with a viable solution. Realtek has a viable single-chip solution that was

demonstrated publicly in June. While not a household name, they are #1 in the world in Ethernet. They don't conveniently fit in the start-up or big company categories but they are definitely poised to be a significant player in WUSB. NEC is #1 in the world in wired USB. They are now certified with a WUSB host solution (no PHY though). They will be a big player in the WUSB market. Intel has a similar play to NEC in that they ship MAC only. They have also been demonstrating publicly and have won some designs. True, Broadcom, TI, ST, Infineon, etc, are not going to be in the game anytime soon, but there are some big players with credible solutions besides the start-ups."

Bowles is as well positioned as anyone to be able to assess this situation. It would be a shame if - all the good work having been done, and a substantial demand created - there was a world shortage of silicon.

Time will tell, but it's an interesting thought.

Snippets

Nokia selects Broadcom for EDGE phones

Nokia has selected Broadcom's single-chip cellular baseband processor and its companion power management unit (PMU) for selected future EDGE mobile phones.

"Nokia has been following the development of Broadcom's single chip EDGE processor and we were impressed with the progress made by the Broadcom team," said Peter Ropke, Senior Vice President of Nokia's Mobile Phones Broad Appeal Business Unit. "Broadcom's EDGE solution delivers an advanced feature-set at low power, small size, and low system cost, which make it an excellent foundation for Nokia's future EDGE products."

According to market research firm iSuppli, the EDGE segment of the mobile phone market is projected to grow from 245 million units in 2007 to over 408 million units in 2009.

... and plans deeper ties with STMicroelectronics

In addition to its work with Broadcom, Nokia says it will get closer to STMicroelectronics, deepening a collaboration on the licensing and supply of IC designs and modem technologies for 3G and its evolution. The two companies also are negotiating a plan relating to transferring a part of Nokia's Integrated Circuit (IC) operations to STMicroelectronics.

Nokia has also awarded ST a design win of a 3G HSPA (high-speed packet access) chipset supporting high data rates, which would be the first contribution of the acquired IC design operations. This design win represents ST's first win of a complete 3G chipset.

Mobile Linux cellular handset support grows

Mobile Linux momentum is growing, according to IMS Research, and some recent key announcements from the LiMo Foundation at the LinuxWorld Conference emphasize the growing support for Linux as a cellular operating system from a broad cross-section of the handset industry. The increased focus on Mobile Linux shows the high level of interest from all segments of the cellular handset industry, including manufacturers, network operators and component suppliers. The LiMo Foundation, comprised of founding members Motorola, NEC, NTT DoCoMo, Panasonic Mobile Communications, Samsung Electronics and Vodafone, announced significant additions to the core membership including Aplix, Celunite, LG Electronics, Wind River and McAfee.

uwb/w-usb news



WTRS' speaks on convergence in the home

- and forecasts legal row in UWB

A new report issued by WTRS finds that emerging wireless technologies such as Wireless HDI (WHDI) and femtocells are driving the convergence of voice and video content in the home. Femtocells allow cellular service providers to offer continuous mobile phone service to the significant percentage of the population who have unreliable phone service in their homes. This is the missing link to allow consumers to avoid the sometimes poor quality of service historically associated with VoIP alternatives, while at the same time eliminating dropped mobile calls in their home.

Wireless HDI technology enables the wireless distribution of uncompressed high definition video content to television sets as advanced as the 1080p sets entering the mass market today. That's the job that the UWB industry is setting out to do, isn't it?

"Service providers who adopt WHDI into set top boxes will provide absolute premium quality service without adding substantial cost," said Kirsten West, PhD, principal analyst with WTRS. "Consumers want high quality, high definition video content and will pay a premium for the ability to utilize the full capability of their TVs."

The WTRS Report, "Wireless Connectivity Technology Trends Summer 2007 Report" identifies other conclusions as well, including:

- 1) The convergence of femtocells with wireless connectivity, how femtocells will affect the Wi-Fi market, and a forecast of the market for femtocells.
- 2) Analysis of Wireless HDI technology, markets, use cases, and its impact on the WiMedia Alliance.

- 3) An analysis of the emerging legal dispute in the Ultra Wideband industry, including the effect of this litigation on wireless connectivity market development and on the WiMedia Alliance.

Incisor didn't know there was 'an emerging legal dispute' in the Ultra Wideband industry, so we spoke to a couple of UWB-industry spokespersons. Neither of them were aware of any significant UWB industry legal dispute, both suggesting that the only thing they could think of was Pulse-Link's action against Tzero (see p15, [Incisor issue 111](#)). Mark Bowles of Staccato Communications commented: "WTRS must be referring to the patent dispute filed by Pulse-Link against Tzero. Whether or not the infringement claim is valid, the accusation has brought a lot of attention to UWB over cable. UWB was synonymous with impulse radio until 2003 when multiband OFDM emerged as an alternative method for using the UWB spectrum. So, it will be interesting to find out if Pulse-Link's claim covers a multiband approach like Tzero has implemented."

Bowles went on to make one more observation: "WTRS has been very aggressive in the past in forecasting alternative UWB solutions to WiMedia and in the end WiMedia has won out over all rivals."

Faraday announces UWB MAC

Taiwanese company Faraday Technology Corporation, which is a silicon IP and fabless ASIC vendor, has announced the availability of an Ultra Wideband (UWB) Medium Access Controller (MAC) solution. Adding onto it's ASIC design service and broad IP portfolio, Faraday claims that the newly released UWB solution enables higher transfer rate at lower pin count for System-on-Chip (SoC) designs. Faraday was demonstrating the UWB MAC IP with a video streaming platform at the Embedded System Conference in Taipei during August.

Faraday comments that most current UWB ASSPs (Application Specific Standard Products) can only achieve 100Mbps or less throughput, due to the low bandwidth limitation of USB and SDIO interfaces. Although UWB with Peripheral Component Interconnect (PCI) interface has better performance, it comes with too many pin counts, and is undesirable for the pad-limited deep-submicron SoC designs. By integrating UWB MAC into the SoC designs, Faraday suggests that designers can easily achieve 200Mbps+ throughput and significantly reduce the chip's pin counts.

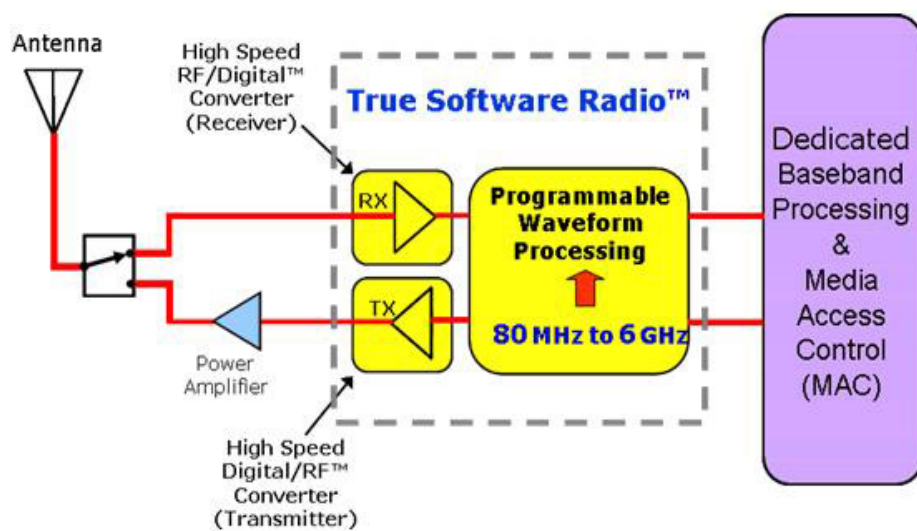
"While most UWB providers focus heavily on interface chips, Faraday is the first ASIC design service company to provide the SoC integration with UWB," said Charlie Cheng, Vice President of Worldwide Marketing at Faraday. "The solution of UWB MAC into SoC makes it perfectly fit the high throughput required applications, such as the consumer electronics and the external storage products."

Faraday's UWB MAC solution utilises industrial standard MAC-PHY Interface (MPI) as the interface between the SoC and the external UWB PHY chip.

"The novel FIFO (First In First Out) and DMA (Direct Memory Access) mechanisms make Faraday's UWB MAC an attractive solution that features high throughput and low cost for applications that require multiple streaming supports," said Thomas Hsieh, Associated Vice President of Central R&D at Faraday. "Furthermore, Faraday's UWB MAC supports hardware accelerator-based Prioritized Channel Access (PCA); it will be excellent for products that requires high throughput, such as wireless USB, cable replacement products, and personal-area networking applications."

Faraday's UWB MAC IP core is available now.

Terocecelo and the soft radio



Terocecelo Inc, which (for those that don't know the company) designs, develops, licenses and markets technology in the communications marketplace, has been awarded a patent for its Self-Tuning Output Digital Filter for Direct Conversion Delta-Sigma Transmitter by the U.S. Patent and Trademark Office. This patent protects an innovation of the company's transmitter chip design, which eliminates a number of discrete components required by other wireless transmitters. The invention is already implemented in the company's Lycon family of chips. These contain the company's True Software Radio technology and make it possible for wireless communications devices to reconfigure automatically solely by software programming.

"Software radio" and "software defined radio" are industry terms which refer to wireless receivers and transmitters that can be controlled and reconfigured by software commands and that can process radio signals digitally for better performance. However, in today's wireless devices, only the RF signal processing (information interpretation) can be performed digitally. Wireless transmitters and receivers still utilize conventional analog transceiver circuitry based on technology first developed in the early 1900s. Existing SDR systems

rely on single and multiband RF transceivers that do not cover a wide and continuous frequency range.

Terocecelo has previously developed and patented True Software Radio, which is a proprietary technology that creates convergence for the wireless industry. True Software Radio has in turn produced the Lycon family of wireless transmitter-receiver chipsets, which are designed to enable cell phones, PDAs, laptops, and infrastructure with different radio frequencies, standards, and protocols to adjust by software command so that they can communicate across otherwise incompatible networks, without the need for multiple radios. Lycon chipsets replace the front end, I/F processing, ADC, and digital filtering sections of radios.

Antonio Turgeon is Chairman of Terocecelo, and told Incisor: "Communication devices, including cell phones, cordless phones, ham radios, citizens band radios, family radios, general mobile radios, multiple use radios, pagers, wireless (Wi-Fi, cellular) computer adapters, wireless PDAs, network and multi-media appliance adapters, GPS trackers, and others, are typically limited to communications on a specific frequency band. The communications industry is looking for a way to create multi-mode wireless devices, based upon

a system-on-a-chip that can handle multiple frequency bands, understand multiple transmission protocols, be reconfigured on the fly, and be easily upgraded. With the convergence of audio, video, data processing and communications services in wireless appliances, True Software Radio offers reconfigurable wireless platform architectures for both computing and communications devices. More importantly, we believe our patent filings and our continuing technology development programs establish the company as one of the pre-eminent leaders in the communications technology evolution, which is an ever expanding, multi billion dollar marketplace."

Ron Hickling, Chief Technology Officer of the company added: "The development of wideband front end receivers and transmitters is key to achieving frequency agility and realizing the ultimate goal of software radio transceivers. This is a critical component of our direct conversion transmission core technology. We know of no other digital filter that can operate continuously across different frequency bands or that automatically adjusts to the proper frequency when transmitting wireless (RF) signals. This circuit does both."

Hickling believes that this latest invention is a key part of Terocecelo's True Software Radio, and that this patent application is applicable to a broad range of communications devices for both wired and wireless environments.

Canadian province embarks on largest wireless mesh deployment in country

IT HAPPENS EVERY DAY: CITIES AND MUNICIPALITIES WORLDWIDE MAKE INFRASTRUCTURE-ENHANCING INVESTMENT DECISIONS - FROM BUILDING A STATE-OF-THE-ART LIBRARY TO RENOVATING A DOWNTOWN SECTION TO BUILDING A FREE WI-FI NETWORK - IN A CONTINUOUS QUEST TO MAKE THEIR CITIES AND TOWNS MORE ATTRACTIVE AND DESIRABLE.



The province of Saskatchewan, Canada, a 660,000 square kilometre region, has added a new dimension to this trend: it is now unveiling the largest outdoor wireless mesh Internet access network in Canada, offering free Wi-Fi to the province's four largest cities. Known as the Saskatchewan! Connected initiative, the Wi-Fi networks will provide free wireless service to visitors, residents, students and businesses in the downtown business districts and post-secondary campuses of the province's largest cities of Moose Jaw, Prince Albert, Regina, and Saskatoon.

One of the province's primary motivations, according to Frank Quennell, Saskatchewan's Minister Responsible for Information Technology, was to entice more technologically savvy young people to pursue their education and build their careers in Saskatchewan. Recently, the province has noticed an increase of immigration as people choose to escape the growing congestion and high cost of

living in Alberta for the short commute times and affordable housing in Saskatchewan. State-of-the-art technology has the potential to be another powerful inducement, as the province learned when it held a Youth Summit in February 2007 to solicit ideas from young people about how to create a more stimulating living environment.

"The creative use of technologies was one of the most compelling ideas suggested by young people at the Summit," says Quennell. "Wi-Fi was tremendously popular. Young people at the conference were asking not only about laptop Wi-Fi connectivity, but about Wi-Fi phones, Wi-Fi music devices and even newer satellite radio devices that can work over Wi-Fi if satellite connectivity was down."

"Soon after the Summit, we gave approval to proceed as part of our ongoing commitment to the use of technology to enhance the quality of life in Saskatchewan."

Government moving at the speed of business

Beyond the size of the Wi-Fi deployment, the other unique quality of the Saskatchewan! Connected initiative was how quickly the government moved from a flurry of ideas to deployment. Governments are notoriously slow in rolling out any new initiative, especially one that is technology based - often taking years to first embrace an idea, gain consensus, then design, and finally deploy a novel technology.

The Saskatchewan Youth Summit was held in February, 2007. The province has now completed rollout of the service less than six months after the idea was first suggested and only 3 months after the go decision was made.

"We are essentially doing a 3-year project in 3 months," says Richard Murray, Executive Director of Policy and Planning with the government's Information Technology Office (ITO).



"The reason that Saskatchewan can move so fast is that it is the only province that has continued to hold on to its incumbent telecom company, SaskTel, rather than spinning it off as other provinces have done," says Lawrence Surtees, vice-president & principal analyst, Communications Research at IDC Canada Ltd. "The advantage is that Saskatchewan uses SaskTel as an instrument of policy and economic development so it can undertake this massive free Wi-Fi deployment based only on the province's best policy interests - and to do so quickly because of its close collaboration between the government and the telecom provider."

As part of the deployment, Saskatchewan is deploying 250 Cisco Aironet 1500 wireless access points (WAPs) in the downtown sections of the four cities, approximately one per city block. According to Murray, the province has been able to install the WAPs much more quickly than they had anticipated.

"We were cautious as nobody had done this before, mounting them on city-owned telephone poles," says Murray. "We estimated an install time of two to three hours per pole, but we were able to do it in 45 minutes per pole. In one day we had mounted all the units on Regina's main downtown street, Victoria Avenue."

Not only does Saskatchewan anticipate the Wi-Fi networks being used by each town's residents, visitors, business people and the universities, it is also receiving other types of inquiries. For example, a collaborative research project between the National Research Council Centre for Sustainable Infrastructure Research (NRC-CSIR), the University of Regina Faculty of Engineering, and the City of Regina, is currently investigating the use of the Saskatchewan! Connected network to develop applications for real-time wireless monitoring of municipal infrastructure systems.

"What we continually learn when we lay out infrastructure, whether the free Wi-Fi now or the fiber optic infrastructure we've laid out over the last 10 years, is that if you deploy it, people will find new and innovative ways to use it," says Murray.

Don Wincherauk, Deputy Minister of the ITO notes that "We provided broadband Internet access to all the schools in our province a few years ago and the usage of the Internet by the schools has been staggering. Time will tell, but I'm convinced that creative uses of the Wi-Fi networks will be just as explosive as we've seen with our other leading-edge network innovations."

OK, Hampshire County Council – if Saskatchewan can do it, Incisor would be very grateful if you could follow the example and liberally scatter free Wi-Fi hotspots all around our local towns, too!

Snippets

A city with no mobile

Just under eight per cent of people owning or running a small business in the UK do not own or use a mobile phone, according to Unicom, the specialist provider of telecoms services to small business.

"It may not sound like a significant figure, but bear in mind there are just over one and a half million businesses in the UK, and the vast majority are sole traders and partnerships. This is the equivalent of a small city without a single mobile phone," said Chris Earle, Operations Director of Unicom. "Some simple maths leaves you asking the question: 'how on earth do around a 120,000 small business owners operate without a mobile phone?' The range of replies as to why they did not use a mobile phone included: 'simply don't need one', that they 'never leave their place of work', 'too expensive', 'I value my privacy'."

Samsung World's second largest mobile phone vendor

According to the latest research from Strategy Analytics, global mobile phone shipments grew a modest 11 percent year-over-year, to reach 258 million units in Q2 2007. Samsung overtook Motorola for the first time, to become the world's second largest handset vendor.

Neil Mawston, Associate Director at Strategy Analytics said, "Total global cell phone shipments have continued to slow down this year, but Samsung is speeding up. A combination of aggressive marketing and an attractive 3G device portfolio has driven Samsung into second position for the first time ever. Its 48 percent annual growth has come partly at the expense of Motorola. Bonny Joy, Analyst at Strategy Analytics, added, "The second quarter of 2007 was not just about Samsung. Nokia hit a record 39 percent share, as it remained dominant in emerging markets."

Users fed up with mobile marketing spam

Results of a GfK NOP survey commissioned by Pontis, a provider of Marketing Delivery Platforms, amongst 752 mobile phone users in the UK reveals a deep dissatisfaction amongst the public with the way that mobile service providers are currently marketing their voice and data services. 70% of mobile phone users consider the marketing offers they receive not to be relevant to them and 64% of these confess to being annoyed by them. Just 11% of those surveyed had ever purchased an item, or signed up for a special promotion or bundle as a result of an online promotion or offer from their mobile service provider.

Wi-Fi / WLAN

Spend on municipal wireless in the UK and US to reach \$6.4 billion by 2012

Municipal wireless is still in the embryonic stages of development. However a report by independent market analyst Datamonitor, says the trend is positioned to explode in the UK and the US over the next five years as local governments and internet service providers recognize the economic and community benefits these networks offer.

Such benefits of municipal wireless networks include making free broadband wireless Internet access available to mobile professionals/citizens, on-the-spot police and fire department access to time sensitive information, lower communication costs for government agencies and improved reputations as 'cutting edge' cities. According to the report 'The Future of Municipal Wireless Networks' spend in the US and UK will grow at a compound annual growth rate (CAGR) of 48% from \$900 million in 2007 to \$6.4 billion in 2012.

RFID

Smart Retail System debuts in Hong Kong

Incisor learns from the IEEE that Schmidt RFID has deployed a Smart Retail System in two Hong Kong stores showcasing the popular Italian-style fashion brand "mi-tu." The technology provides customers with real-time mix-and-match style advice - either in front of a special Smart Dressing Mirror in the store, or while trying on clothes inside an interactive fitting room. When clothing is brought in front of the mirror, it automatically detects the item's RFID tag, displays the image of a model wearing it, and suggests matching items that are also shown on the model. The Smart Fitting Room adds a touch-screen LCD, which displays the same mix-and-match suggestions but with more options. An intercom allows customers to request store staff bring them the new items suggested by the system. Mi-tu credits this intelligent system with increased sales and improved customer satisfaction. According to Schmidt RFID, the use of RFID tags can also inform supply chain management and logistics control. Elements of the Smart Retail System were co-developed with the Institute of Textiles & Clothing of The Hong Kong Polytechnic University.

nfc and rfid news



NFC Forum takes next step to push technology

The NFC Forum, whose role in life is to promote the use of near field communication (NFC) technology, has announced the publication of four tag type technical specifications.

Incisor has covered NFC for some time now, but by way of a quick re-cap, consumers with NFC-enabled mobile phones can, for example, leave their wallets at home and use their phones to conduct contactless financial transactions – waving their mobile in the direction of the barista at Starbucks - or to gain electronic access to public transportation.

Tags store data that can be read by NFC-enabled devices to support these applications. For example, a cinema goer with an NFC-enabled mobile phone could touch the phone to a movie poster containing an embedded NFC tag to view a preview of the movie.

By standardizing the tag types and formats with the specifications announced, the NFC Forum says it is promoting interoperability across the NFC market, enabling low-cost volume production, and clearing a path to a global, cost-effective mass market. More than one billion NFC-ready tags are already deployed worldwide for use in areas such as accessing public transportation, hotel rooms, and offices.

The Forum's tags are based on the International Organization for Standardization (ISO) 14443 Type A and B standards and Sony's FeliCa. The four tag types are all based on existing contactless products and are available commercially.

The NFC Forum has mandated that the four tag types be operable with NFC devices. The tag specifications are the most recent in a series of specifications being developed by the NFC Forum. The operation specs for the NFC Forum tag types, numbered 1-4, provide

the technical information required to implement the reader/writer and associated control functionality of the NFC device, enabling interaction with the tags. The four tag type specifications are:

NFC Forum Type 1 Tag Operation Specification

Type 1 tag is based on ISO14443A. Tags are read and re-write capable; users can configure the tag to become read-only. Memory availability is 96 bytes and expandable to 2 kbyte; communication speed is 106 kbit/s.

NFC Forum Type 2 Tag Operation Specification

Type 2 tag is based on ISO14443A. Tags are read and re-write capable; users can configure the tag to become read-only. Memory availability is 48 bytes and expandable to 2 kbyte; communication speed is 106 kbit/s.

NFC Forum Type 3 Tag Operation Specification

Type 3 tag is based on the Japanese Industrial Standard (JIS) X 6319-4, also known as FeliCa. Tags are pre-configured at manufacture to be either read and re-writable, or read-only. Memory availability is variable, theoretical memory limit is 1MByte per service; communication speed is 212 kbit/s or 424 kbit/s.

NFC Forum Type 4 Tag Operation Specification

Type 4 tag is fully compatible with ISO14443A and B standards. Tags are pre-configured at manufacture to be either read and re-writable, or read-only. Memory availability is variable, up to 32 KBytes per service; communication speed is up to 424 kbit/s.

The specifications are available to the public for download at no charge from the NFC Forum Web site, www.nfc-forum.org/specs/.

Washington chooses Digimarc to implement RFID-based border crossing pilot

Digimarc Corporation has signed an agreement with the Washington State Department of Licensing (DOL) to support the State in implementing their newly developed Enhanced Driver License (EDL). Washington DOL and the Department of Homeland Security (DHS) have agreed to run an initiative that allows the EDL to be used as an alternative travel document to re-enter the United States through sea and land border crossings. Digimarc will supply Washington DOL with applicant enrolment and screening solutions as well as production of the RFID-enabled EDL.

Washington's enhanced driver license system will utilise Digimarc applicant screening solutions to verify an applicant's identity documents, and will include data such as name and address; and facial biometrics to ensure that only one license is issued to one legitimate card holder.

Digimarc launched ExianSmart, its chip-enabled driver license solution last year in anticipation of the States' needs for new applications of the driver license. The Digimarc ExianSmart driver license for Washington will include RFID technology that is compatible with the DHS Western Hemisphere Travel Initiative program. This will allow people to carry a single credential that meets their driving, identity, and land and sea border crossing needs.

Recent legislation in Washington authorises the use of enhanced driver licenses, issued on proof of citizenship, identity and residency, as a WHTI alternative document to a passport for re-entry into the United States. The new licenses will cost \$40. The Enhanced Driver License itself will carry traditional security features found on the current Washington driver license, including digital watermarking, as well as new features including an RFID chip and a "Machine Readable Zone" (MRZ) that is compatible with travel document readers.

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events



DATE	EVENT	LOCATION	NOTES	LINK
Sept 3 - 4 2007	Wireless Developer Forum	Beijing, China	-	www.wirelessdeveloperforum.org
Sept 5 - 6 2007	7th Annual Wireless China Industry Summit	Landmark Towers & Hotel, Beijing, PRC	-	http://www.beaconevents.com/en/latestnews.html
Sept 7 2007	MCPC Mobile Solution Fair 2007	Tokyo, Japan	-	http://www.mcpc-jp.org/fair2007/
Sept 10 - 11 2007	GSM 3G Middle East & Gulf	Dubai International Convention Centre, Dubai, UAE	-	http://www.gsm-3gworldseries.com/meg/
Sept 25 2007	Bluetooth SIG EMEA holiday gift event	London, UK	A gathering in London to highlight Bluetooth products to the press	http://www.bluetooth.com/Bluetooth/Press/Events/
Oct 8 - 12 2007	Bluetooth SIG UnPlugFest 28	Brussels, Belgium	-	www.bluetooth.org
Oct 31 - Nov 1 2007	Bluetooth Evolution – Conference & expo	London, UK	Jointly hosted by IMS Research and the Bluetooth SIG	http://www.imsconferences.com/bluetooth/
Nov 6 2007	Bluetooth Developers Conference 2007	Yokohama Royal Park Hotel, Yokohama, Japan	-	www.bluetooth.org
Jan 2008	2008 Wireless Symposium	Las Vegas, USA	Email: Vince Holton - vholton@incisor.tv or Steven Clarke - sclarke@incisor.tv	
Jan 7 - 10 2008	2008 International CES	Las Vegas, USA	-	http://www.cesweb.org/
March 31 2008	Phoenix, Arizona, USA	Bluetooth SIG All Hands meeting	-	www.bluetooth.org

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