INCISOR™

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Video enabled Issue 119 March 2008

THE RACE FOR HIGH SPEED BLUETOOTH

THIS ISSUE

BLUETOOTH SIG OPENS ARMS TO 802.11

BENEFITS OF ENHANCED GPS

THE BOX: A NEW WIRELESS DIVINITY

the non-stick SIG

I am starting to think that the Bluetooth SIG is a very clever player in the game of WPAN poker.

It was back in March 2006 that Incisor reported on the Bluetooth SIG's announcement of a tie-up with the WiMedia Alliance to provide a high-speed data channel as part of the Bluetooth portfolio. Since then, people have waited patiently for said channel to become available. Or they did for a while.

UWB, the technology of choice, has taken about the normal, and expected, time to come to market. But people are impatient. Despite the fact that the Bluetooth SIG probably would have been able to deliver UWB-based High Speed Bluetooth around the time it said it would, other pressures have been applied.

Whether it has been purely the handset companies trying to rush products to market, proclaiming 'hey, I already have a Wi-Fi radio in my phone', or the Wi-Fi semiconductor companies applying pressure because this was a business opportunity they were not prepared to let slip by, we'll probably never know.

The bottom line is that the Bluetooth SIG has had to act, and has announced that it is developing a technology called the 'Alternate MAC/PHY'. In a nutshell, this is a way of being able to use 802.11 as well as, or even instead of, UWB.

This is a fairly big deal, and some people will be seen to have gotten their way. What is sure is that the SIG has demonstrated once again that it can duck and dive with the best of them. Read more about it in this issue.

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

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news

BitWave launches programmable transceiver

Fabless semiconductor company BitWave has launched a product that really made us stop and think. And to ask 'why has nobody else done this?' BitWave's wonder product is a programmable CMOS RF transceiver, the BW1102 Softransceiver RFIC.

This single, low cost, low power chip is being targeted at the cellular handset and femtocell markets and is fully software configurable across all channels in the frequency bands between 700 MHz and 3.8 GHz. This allows the BW1102 to be configured for multiple wireless protocols such as GSM, GPRS, EDGE, WCDMA, HSDPA, CDMA2K, EVDO, 802.11b/g and 802.16d/e.

BitWave tells us that the BW1102 (which, if we are honest, sounds a bit too good to be true!) enables wireless consumer applications to 'seamlessly switch between multiple frequency bands and wireless communication protocols thus ensuring global connectivity for wireless devices'. BitWave goes on to say that using the BW1102 in wireless designs allows manufacturers to reduce component count, lower BOM costs and improve time to market.

Additionally, the BW1102 can be reconfigured to support new bands, such as the 700 MHz band, becoming available in the US in 2009, or new protocols, such as LTE, the next generation protocol in the UMTS family. The flexibility of multiple wireless bands and multiple protocols of operation is achieved using software mode files, a first in the RFIC industry. This provides the BW1102 Softransceiver with the ability to be at the core of multiple product designs.

BitWave designed the Softransceiver to have a very small footprint and require minimal external components. The BW1102 is built on a standard digital CMOS process and is supplied in a 7x7 mm PBGA package for low cost and small size. The transceiver integrates all requisite RF, analog, mixed-signal and digital circuitry and also includes built-in test and calibration.

"With the BW1102 Softransceiver we've made wireless connectivity simple," commented BitWave CEO Michael Farese. "Handset designers can now easily provide one model that works on any network, at any frequency, using any protocol, anywhere. The BW1102 is the industry's first software programmable transceiver platform".

Samples of the BW1102 will begin shipping to customers during the next month and volume production shipments will begin during Q3 2008.

CSR demos single-chip Bluetooth + GPS silicon

CSR was demonstrating the benefits of eGPS technology at Mobile World Congress. The British semiconductor company has integrated GPS with cellular measurements to create eGPS® (enhanced Global Positioning System) technology which, says CSR, is capable of providing accurate position information on demand in all environments.

CSR told Incisor that its location technologies are now proven to provide the significant power and performance improvements necessary for embedding into a mobile handset, and that its first single-chip GPS with embedded Bluetooth and FM radio technologies was back from the fab and proven working.

CSR's eGPS demonstrations showed how its technology can be embedded into a standard slim-line handset and minimises power usage as well as avoiding conflicts with other handset technologies. Using off-the-shelf mapping software, CSR's demo showed accurate turn-by-turn navigation driven by signal processing software running entirely upon the embedded host applications processor. A comparative demo against conventional A-GPS systems showed greatly improved time to first fix (TTFF) in difficult environments and a reliable fallback position based on cellular measurements when A-GPS fails. CSR's Bluetooth silicon with embedded support for eGPS allows satellite measurements to be maintained when the host processor is powered down, providing position information on demand while minimising power and resource loads. A typical eGPS push-to-fix will be available in less than 4 seconds, accurate to within 10 metres and requires the equivalent power of less than 1 second of handset talk time.

CSR's eGPS techniques augment traditional GPS or A-GPS with cellular network measurements to provide an improved user experience. CSR believes that the universal availability of location information, increased responsiveness and reduced power consumption make eGPS far more appropriate for use in mobile handsets when compared with current GPS technologies. eGPS works globally, providing more accurate position information than conventional cellular-based technologies and allowing carriers to support the fine time aiding critical to GPS performance in difficult environments without needing expensive overhauls of unsynchronised GSM or W-CDMA network infrastructure.

CSR's CEO, Joep van Beurden commented, "Along with last month's announcement of the intention to form the EGPS Forum with Motorola (Ed. - see page 7, Incisor issue 118), our working silicon and demonstrations at Mobile World Congress are all significant steps on CSR's roadmap towards adding high performance, yet power-efficient eGPS to cellular phones at an additional cost of less than $1. Our patented eGPS technologies are ready to change the market for location technologies in mobile handsets."

news

Aussie 60GHz CMOS chip offers 5GB/s at 10% of the cost

National ICT Australia (NICTA), which is Australia's Information and Communications Technology (ICT) Research Centre of Excellence, is shouting from the rooftops about the fact that researchers from its Gigabit Wireless Project, which is based out of NICTA's Victoria Research Laboratory, are the first in the world to have developed a complete transmitter and receiver on a single chip at 60GHz on CMOS.

NICTA says that the integrated transceiver is extremely small and can be embedded into devices, enabling the much-fabled 'truly wireless office and home of the future'.

NICTA's bold claim, which seems to demonstrate a characteristically Australian lack of guile or modesty, is that the technology breakthrough will enable the wireless transfer of audio and video data at up to 5 gigabits per second, and suggests that this will be ten times the current maximum wireless transfer rate, and at one-tenth the cost.

The technology was developed using the IBM 130nm RF CMOS process. "Our collaborators IBM, Synopsys, Cadence, Anritsu, Agilent, Ansoft and SUSS MicroTec have been critical to our success," said NICTA's gigabit wireless project leader professor Stan Skafidas. "Our innovative design methodology and access to leading design, test and measurement, and fabrication technology has allowed us to deliver this world-first success."

Skafidas explained that the NICTA researchers chose to develop this technology in the 57-64GHz unlicensed frequency band as the millimetre-wave range of the spectrum makes possible high component on-chip integration as well as allowing for the integration of very small high gain arrays. "The availability of 7GHz of spectrum results in very high data rates, up to 5 gigabits per second to users within an indoor environment, usually within a range of 10 metres."

Without wishing to sound too sceptical, it does seem a little unlikely that a group of Australian researchers has out-manoeuvred the entire semiconductor industry to deliver a viable, 60 GHz CMOS solution so soon, but stranger things have been known.

Whether this becomes a real-world product, or disappears without trace, remains to be seen.

Texas Instruments demonstrates Android

Texas Instruments (TI) gave visitors to Mobile World Congress an early look at the Android mobile platform in two forms: a prototype handset based on TI's OMAP850 processor that also includes Wireless LAN (WLAN) and Bluetooth wireless technology solutions, as well as an OMAP3430 processor-based Zoom Mobile Development Kit from Logic PD.

Android, currently released as an 'early look' to developers, is a complete mobile phone software stack including an operating system, middleware and key applications, and is intended to provide an open platform for mobile devices. TI's aim is that developers will be able to create mobile applications that maximize the fullest potential of a TI OMAP processor-based solution. The UI on this mobile platform will provide access to applications on the device including web browser, email, messaging and video. Android features integrated connectivity options via TI's WiLink WLAN and BlueLink Bluetooth solutions.

"TI's OMAP applications engine provides the perfect combination for performance and power to deliver an optimized multimedia and UI experience in conjunction with Google's Android framework," said Avner Goren, worldwide director of strategic marketing, TI's Wireless Terminals Business Unit.

Wipro-NewLogic provides qualification-ready Bluetooth 2.1 + EDR IP

Wipro-NewLogic, which develops Bluetooth and Wireless LAN IP, has announced that its Bluetooth baseband IP (BOOST) Core has passed the official testing for Bluetooth 2.1 + EDR compliance in a Bluetooth Qualification Test Facility.

This baseband, combined with the Wipro-NewLogic Bluetooth 2.1 + EDR RF IP, offers a range of system configurations. The IP can be integrated into multiple solutions like connectivity chipsets, applications processors or other system on chips for the mobile, automotive and consumer markets. Various generations of the IP have already been integrated by leading brand names from the USA, Europe, Japan and APAC.

"We are today the only company that provides an interoperable and ready for qualification Bluetooth 2.1 + EDR IP core", said Franz Dugand, product marketing manager at Wipro-NewLogic. "It was important for us to pass official testing in a Bluetooth Qualification Test Facility to show our commitment to enable our customers' product to achieve full interoperability. This guarantees that our customers will successfully pass Bluetooth qualification, enabling them to get to market quickly and without risk, with the most advanced standard features available."

Wipro-NewLogic claims to be the world leader in the sale of IEEE1394, WLAN and Bluetooth IPs.

news

Super-fast TTM for NTEEP internet radio module

CSR's RadioPro example design has been selected by NamTai Electronic & Electrical Products Limited (NTEEP) for its internet radio module, based on CSR's single-chip Wi-Fi silicon, UniFi-1. NTEEP tells us that the RadioPro design has made it possible to bring its internet radio module to market in only eleven weeks.

NTEEP's aim was apparently to produce a versatile module that can easily be adapted to provide Wi-Fi functionality in a number of products including portable media players (PMPs), DAB radios, digital photo frames and VoWi-Fi phones. With full hardware and software components included, the module features an embedded microstrip antenna and an integrated PA and LNA to allow designers to add an external antenna if desired. CSR's RadioPro provides wireless streaming of internet radio via Wi-Fi.

CSR states that UniFi is the lowest power Wi-Fi solution in the market and features an exceptionally small chip scale package (CSP) that measures just 5.8 x 6.4mm. This has enabled NTEEP to produce its internet radio module in a form factor of just 40mm x 40mm x 2.85mm. The module is also directly mountable by SMT equipment for high volume and efficient production.

RadioPro boasts up to 25 hours of active streaming time based on 1500mAH battery. Integrating a high performance 2.4GHz radio, baseband processor and media access controller (MAC), RadioPro includes all the required hardware drivers and a software development kit (SDK) to bring an internet radio to market at a low cost.

Karene Wong, CEO of NTEEP commented, "We are focused on bringing new products to the market quickly to respond to the latest trends. Implemented properly, internet radio is a huge opportunity. The simplicity and ease of use of CSR's RadioPro design allows us to bring our low cost, high quality internet radio modules to the market in a timely fashion for our customers to capture business opportunities."

Tracy Hopkins, Vice President of CSR's Consumer Business Unit, commented, "The internet radio module produced by NTEEP is an excellent example of what we aim to achieve, with RadioPro, for our customers. This reference design enables new and diverse applications simply and quickly whilst allowing best in class functionality."

Wireless spending to exceed 12% of IT budgets in 2008

Wireless Enterprise Strategies' service team released the results of its latest survey of European IT Managers' expectations for wireless deployment the Mobile Wireless Congress.

A survey of IT managers in UK, France and Germany has identified strong demand for wireless and mobile solutions from SME (Small and Medium Enterprises) to Multi-national brands.

Andrew Brown, Director of the Wireless Enterprise Strategies service, commented, "Spending on wireless solutions is expected to grow by 23% in the UK alone over the next two years, despite flat overall IT budgets in two-thirds of companies. In France and Germany, wireless spend per employee is expected to approach 100 Euros within 2 years."

David Kerr, VP of the Strategy Analytics global wireless practice commented, "Wireless Security (23%) and Wireless Applications (18%) are the top solutions where increased spend is expected in the next few years. However, there is also a strong focus on in-building wireless infrastructure as an area for increased spend; while remote device management is also on the radar screen with 8% planning increased wireless spend here in 2008."

Other key findings from the study included:

- After email (54%), shared contact/address book is the second largest base of installed wireless applications (40%);
- FIRE (Finance Insurance and Real Estate) is the leading edge vertical with 14% of IT spend committed to wireless solutions in 2008;
- RIM (hardware and middleware), Microsoft (software & middleware) and Nokia (hardware) best positioned for priority spend by business in 2008;
- FMC for voice is the best opportunity in medium and large business as well as FIRE but FMC less than 3% of wireless spend in 2008;

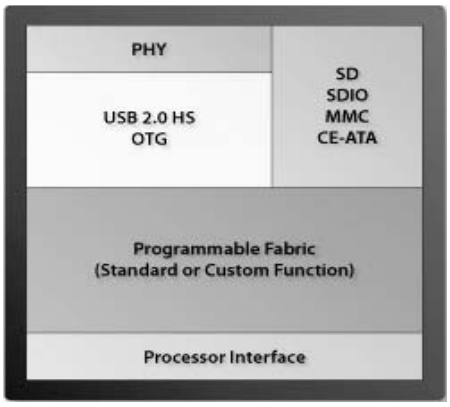
Contact Strategy Analytics for more info.

Jennic appoints Tony Gallagher as COO

UK ZigBee specialist Jennic Ltd. has appointed Tony Gallagher as chief operating officer. Gallagher will coordinate all operations and product development within Jennic, which describes its current position as 'becoming a volume supplier exploiting the opportunities emerging in the wireless microcontroller market'.

Gallagher's background is as a financial, business and operations manager of global semiconductor companies. His most recent role was senior VP, worldwide operations at Zarlink Semiconductor and previously held roles at GEC-Plessey Semiconductors and SGS Thomson.

news



QuickLogic relieves handset host processor

Applications for QuickLogic's 'fabric and functions' configurable companion device for handset were on show in Barcelona. Among a number of configuration options was a data transfer capability that allows PC-to-handset communication of large files - such as videos - independently of the handset's host processor, with traffic flowing directly between a handset's USB port and hard disk.

QuickLogic's ArcticLink device provides hard-wired cores, plus an array of programmable fabric, with a library of functions for handheld products. The platform can act as a companion device for handset processors. For example, it can autonomously perform high-level functions in the display and/or mass storage interface paths, relieving the load on the host processor.

ArcticLink's hard-wired cores include a USB 2.0 On-The-Go controller and PHY, and configurable storage interface - the latter being able to serve as controller for SD or MMC memory cards, managed-NAND memory, or various flavours of interface to miniature hard disk drives.

The programmable fabric element has low power consumption and can be used to implement an application processor interface plus (typically) several additional functions such as DRM or Bluetooth EDR-compliant UARTs. The latest option in this area is an independent data transfer capability that is designed to provide file transfer and/or synchronisation between PCs and handsets controlled by utilities such as Microsoft's ActiveSync.

As well as relieving the load on the host CPU, ArcticLink is claimed to speed up operations: the architecture can apparently handle data rates up to 33 Mbytes/second for instance - which is as fast as the maximum transfer speeds of today's typical miniature hard disk drives.

connectBlue shows Wireless Network Platform for industrial use

Swedish IA specialist connectBlue tells Incisor that it's new industrial Wireless Network Platform enables a robust and reliable Bluetooth connection between the Ethernet based infrastructure and industrial equipment such as machines, machine parts, barcode readers, mobile human-machine interface (HMI) devices, sensors, pro-grammable logic controllers (PLC) and more.

In industrial applications, the device becomes a universal "Ethernet to Bluetooth" enabler since it has a variety of possible use cases that are all configured via customized web pages. One feature is the Ethernet cable replacement possibility that provides wireless communication to moving / rotating devices or when cables are difficult or expensive to install. Thanks to the Terminal Server Functionality the Wireless Terminal Platform accommodates up to seven Bluetooth Serial Port connections to an Ethernet network. This function provides virtual serial cables between the industrial devices and a PC connected to the Ethernet.

"The Wireless Network Platform does not just simplify and reduce the actual installation costs, it also provides a completely maintenance free connection," commented Rolf Nilsson, President of connectBlue. "And though the product itself is new, the underlying platform is a proven solution that has been in years of operation 24-7 under rough industrial conditions. This is why we can vouch for the Wireless Network Platform being the smallest high performing industrial Bluetooth access point available on the market."

Nilsson added that the new Industrial Wireless Network Platform is ideal when Bluetooth enabled mobile and rotating devices such as PDAs, conveyor, transportation systems or robots are to be connected into the existing Ethernet infrastructure.

INCISOR TV Video presentations

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

Click on the links below to watch recent Incisor TV presentations

10 years of Bluetooth / Best Bluetooth of CES 2008

CES 2008 – Profile of Parrot

Introducing Incisor

2007 Wireless Symposium

Bluetooth / Wibree launch event (full version)

Incisor TV overview: the Bluetooth SIG / Wibree Forum merge

Best Bluetooth of CES 2007

Incisor profile: Icron Technologies and Extreme USB

Wireless USB special - Introducing Wireless USB

Wireless USB special - Wireless USB in use

Wireless USB Special - Regulatory, approvals and interoperability

Wireless USB special - The future for Wireless USB and UWB

Wireless USB special - Wireless USB at CES 2007

Vince Holton introduces the High Speed Bluetooth Special Issue

Anders Edlund of the Bluetooth SIG - Bluetooth and UWB combined

Robin Heydon, CSR - Bluetooth & UWB - The semiconductor company perspective

Motorola's Steve Deutscher examines High Speed Bluetooth mobile concepts

Motorola video - Jordan's morning

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new products

Sony Ericsson acknowledges iPhone

Surrounding the launch with a great deal of marketing and PR guff about 'the world of our consumers and customers is changing' (too right – Apple pulled the rug out from under you!) and meeting 'the growing need for mobile Web communication and multimedia entertainment', Sony Ericsson has launched a touch-screen, iPhone-alike handset under the cloak of a new brand - XPERIA.

The first XPERIA phone is the X1, an arc slider phone. The Windows Mobile-based X1 features a full QWERTY keyboard within a metal-finish body. Is Sony Ericsson right to cling to the 3-D keyboard approach, or should it have been as brave as Apple and foregone physical keys altogether? Time will tell.

As a tip of the cap to Apple, Sony Ericsson has included what it calls XPERIA panels – the square application icons on the touch-screen, which Sony Ericsson invites you to 'arrange as you want for easy access'.

High data rate connections and short-range WPAN stuff are provided for by the inclusion of HSDPA/HSUPA plus stereo Bluetooth and Wi-Fi.

Incisor hasn't had a chance to play with an X1 so far, but it is likely that as a first response to the iPhone, it isn't going to be perfect. However, Sony Ericsson had to plant a flag in the ground to say it was in this market. The XPERIA X1 will be available in selected markets from the second half of 2008.

Half-way house

Sony Ericsson has also launched two other touch-screen phones – the G700 and G900, which are described as touchscreen organisers.

The G700 sets out to manage your contacts, calendars, notes, pictures and favourite apps, while the G900 has all the functions of the G700 with the added features of a 5.0 rather than 3.2 megapixel Touch Auto Focus camera, touch photo album and editor. Both are stereo Bluetooth enabled.

The G700 will launch in Silk Bronze and the G900 will launch in Dark Red and Dark Brown. Both are UMTS 2100 and GSM/GPRS 900/1800/1900 phones that will be available in selected markets from Q2 2008.

Squawk boxes from Parrot

Aimed at anyone that stores their music on a computer, mobile phone or MP3 player, the Parrot DS1120 is a new wireless (or wired too, actually) hi-fi stereo concept.

For those looking to banish wires, the speakers are Bluetooth v2.0 + EDR –enabled, and a Parrot Bluetooth adapter is supplied with the DS1120, which will then play content from any Bluetooth stereo (A2DP - Advanced Audio Distribution Profile) source. In addition to the A2DP support, the DS1120 also provides track and volume control via the AVRCP (Audio Video Remote Control) profile)

Each speaker features a built-in Class D digital amplifier with a power output of 30 W RMS. Touch-sensitive keys and a bass system are hidden in the stands. The Parrot DS1120 also accepts all analogue audio devices connected to the 3.5 mm jack line-in socket, like MP3 players, CD players and tuners.

Dimensions-wise, each speaker is 153 x 144 x 131 mm and weighs 950 g.

To see this product in action, watch Parrot CEO Henri Seydoux demonstrating the DS1120 as part of the IncisorTV profile of Parrot recorded at CES 2008.

Internet for the Martini crowd (Any time, any place, anywhere ….)

These aren't WPAN products, but if, like us, you regularly need an Internet connection when you are out and about, and there just isn't a handy (or - more accurately – free!) Wi-Fi hotspot available, we think you will be interested. Sony Ericsson has come up with a solution. It has launched its first HSPA 7.2/2.0 devices with the ExpressCard/34 form factor, the EC400 and EC400g.

Both mobile broadband ExpressCards enable instant Internet access, wherever you happen to be. Slam one of these into your laptop's ExpressCard slot, and the EC400 and EC400g allow up to 7.2 Mb/s in download and 2.0 Mb/s in upload speeds. Additionally, the EC400g is equipped with an inbuilt GPS receiver.

The EC400 / EC400g auto-install and auto-configure, so there is minimal fuss involved with getting up and running. In addition to their integrated antennas, the EC400 and EC400g sport a second antenna, which can be flipped-up to further increase the radio signal reception.

The EC400 / EC400g are HSPA/UMTS, Tri-band 850/1900/2100 MHz, EDGE/GPRS, Quad-Band 850/900/1800/1900 MHz ExpressCards that will be available globally by mid 2008.

The ExpressCards automatically identify your network provider and apply the appropriate network parameters, once inserted into your laptop. Nowhere in Sony Ericsson's press materials does it mention that these cards will be expensive to run, but you can bet that they will be.

ISSCC show report

ISSCC also goes very wireless

By Mads Oelholm

Last month I was in Las Vegas for CES, and this month it was ISSCC (the International Solid State Circuits Conference), which is held every year in February in San Francisco. This year the crowd was even larger than usual and the new innovations more exciting than ever.

Among the most interesting revelations was a reconfigurable radio from BitWave. The radio covers the entire spectrum from 700 MHz up until 3.2 GHz (*see **BitWave launches programmable Transceiver** in this issue*). Not only is this a very broad supported spectrum, but the radio also supports a wide range of protocols including GSM, EDGE, WCDMA, HSDPA, Wi-Fi and WiMAX. The re-configurability of the radio means that it is possible to support not only existing protocols but also future enhancements as well as brand new protocols. Later in the year spectrum around 700 MHz will be available in the US and the chip will also support this.

The BitWave BW1102 Softransceiver is manufactured in standard CMOS, which means that it will be relatively cheap compared to existing solutions requiring multiple radios. With a reconfigurable and programmable chip like this it will be possible for a large number of manufacturers to create truly universal mobile units that will work world wide. BitWave expects to start sampling the chip pretty soon with volume manufacturing next year.

NXP Semiconductors also revealed a radio working over the entire spectrum from 600 MHz to 10.6 GHz. The radio covers a wider range than the chip from BitWave, but is not as advanced when it comes to programming. That said, it is still a very exciting piece of hardware as it allows manufacturers to implement a diverse range of protocols using a single chip.

Alereon also revealed the details behind a fancy new UWB chip supporting all 6 WiMedia bandgroups from 3.1 to 10.6 GHz. The device is manufactured in 0.13ìm SiGe BiCMOS technology and contains 2 different interfaces to the antennae: one narrow-band (3 to 5GHz) and the other broadband (3 to 11GHz). This chip could be very important as UWB becomes a world-wide phenomenon. Whereas the US allows the entire spectrum from 3.1 to 10.6 GHz to be used, other regions and countries impose restrictions on allowable frequencies. It is therefore important for manufacturers to have a reconfigurable radio that can be adopted to meet local requirements.

In addition to these wireless chips, about 250 other players were presented, with products ranging from microprocessors with more than 64 cores, to advanced flash memory.

ISSCC will be held again in San Francisco in February 2009.

Snippets

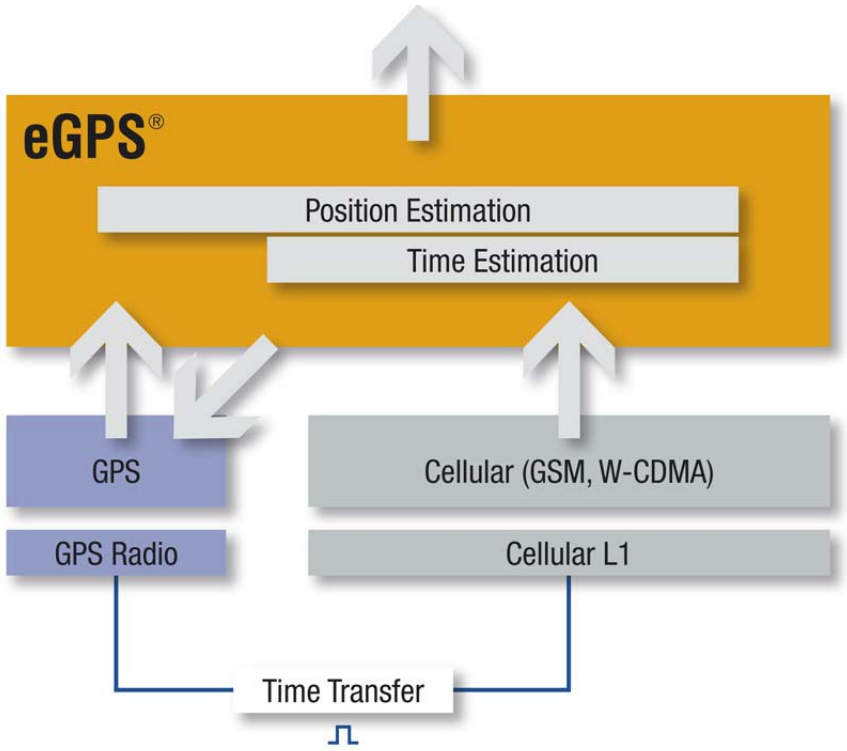
Sony Ericsson moves to Windows mobile

Sony Ericsson will apparently introduce its first Windows Mobile phone later this year. Until now, it has primarily used the Symbian operating system for its smart phones. The Windows Mobile phone will have a touchscreen, aping Apple's iPhone. Sony Ericsson has been using the UIQ user interface on its Symbian phones. UIQ competes with Series 60, the user interface Nokia developed to run on its Symbian phones.

Sony Ericsson will probably continue to sell Symbian phones in addition to the Windows Mobile handset. No.1 player Nokia isn't supporting Windows Mobile, but is using Linux to power handheld computers, in addition to its widespread use of Symbian.

Benefits of an enhanced GPS hybrid system

by Martin Reidevall,
CSR's Location Based Services Business Unit



If GPS attach rates in mobile phones are to grow in line with hopes and expectations it is crucial for GPS technologies to overcome the limitations of current systems. Current location technologies only meet very basic needs of consumers and regulatory requirements. High value commercial services require location technologies in mobile handsets to provide prompt, consistent and reliable position information, even indoors, within the limited power budget of a portable device. Emergency services also require accurate indoor positioning.

The problem with GPS for mobile phone applications is that signal levels are low, and, in urban environments, signals are likely to have been reflected at least once before arrival at the receiver. This can cause problems when the phone is used in a building, or even in an area where a direct view of the satellite is masked. Additionally, the time taken for the receiver to achieve a position estimate, Time To First Fix (TTFF), can be minutes, if it is possible at all and this isn't acceptable.

To achieve faster acquisition times, the GPS receiver needs assistance, giving rise to the requirement for Assisted GPS (A-GPS). A-GPS uses the mobile phone network to assist the GPS receiver in the mobile phone to overcome the problems associated with TTFF and the low signal levels that are encountered under some situations.

A very important element of assistance data is fine time aiding. That is, a timing relationship between the arrival of cellular signals and GPS signals at the receiver. When available, fine time aiding can have a massive impact on reducing the sensitivity and TTFF, especially in weak signal environments. Unfortunately, the provision of fine time aiding in unsynchronised networks, such as GSM and WCDMA, is challenging and until now, largely unheard of.

In this case, the fallback method typically is Cell ID, in which the terminal's position is reckoned as the position of the serving base station or the centre of the serving cell. The problem with the existing Cell ID method is that it is quite inaccurate. Enhanced Cell ID methods, which involve using the location of neighbour cells, received signal strength and network parameters (such as timing advance in GSM) can be used to improve the accuracy, but errors of several kilometres are still quite common.

Enhanced GPS (eGPS) is a collection of techniques that augment traditional GPS or A-GPS, to provide a much improved user experience. Universal availability of location information, increased responsiveness and reduced power consumption make eGPS far more appropriate for use in mobile handsets when compared with current GPS or A-GPS-only technologies. eGPS works globally, providing far more accurate position information than conventional cellular-based technologies and allowing carriers to support the fine time aiding critical to GPS performance, independent of network support. eGPS also works in difficult environments without needing expensive overhauls of unsynchronised GSM or W-CDMA network infrastructure. In situations where a GPS fix is not possible, eGPS provides a cellular-based position estimate that is an order of magnitude more accurate than Cell ID – typically 100m.

In tests, eGPS is shown to offer improvements to the time-to-fix, due to a substantial shrinking of the required search space (in tests performed by CSR on its eGPS technology, it enabled a saving of 96% of search space) – this results in a much shorter acquisition time for a satellite signal. The eGPS hybrid approach also results in substantial power savings when the GPS receiver is implemented in software (there is a reduced load on the host processor by a factor of 5) as well as major improvements to sensitivity, accuracy and time to first fix when compared to standalone GPS systems, or to A-GPS systems.

Overall, it is obvious that a GPS receiver enhanced by eGPS, will be a significantly more attractive solution for handsets. CSR has developed eGPS technologies and together with Motorola, also agreed in January to form the EGPS Forum to further test and develop eGPS technologies and infrastructure.

Bluetooth SIG opens arms to 802.11

ON THE 11TH OF FEBRUARY 2008, AT THE MOBILE WORLD CONGRESS EVENT IN BARCELONA, THE BLUETOOTH SIG MADE WHAT WILL BE SEEN BY MANY AS A MOMENTOUS ANNOUNCEMENT. THIS WAS THAT IT WOULD, AFTER A PERIOD OF SOME INTENSE SPECULATION, EMBRACE WI-FI OR 802.11 AS A HIGH-SPEED DATA TRANSFER MECHANISM.

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Now, it is not that long ago – March 2006, in fact - that the SIG announced that Ultra Wideband (UWB) was to provide that channel. In some quarters it has been said that UWB has taken longer to come to market than planned/expected, and by the end of 2007, some of the major handset manufacturers were getting very impatient (see page 9, Incisor issue 115). They (the handset manufacturers, who are also the biggest customers for WPAN silicon) were already putting Wi-Fi in their handsets, there was consumer demand for high bandwidth connectivity, and so why should they wait any longer for UWB?

It was hard to disagree with the point that was being made, even if it seemed to create a situation requiring a serious volte-face for the SIG if it was to respond. And an awkward conversation with the WiMedia Alliance, the body responsible for UWB and Wireless USB.

Whether, or not, the Bluetooth SIG was pressurised into acting, and/or it decided of its own volition that action was necessary, we now know that Bluetooth and 802.11 will share the dance floor.

In reality, the Bluetooth SIG has handled the situation with some aplomb. Its response is not to publicly abandon UWB in favour of 802.11, but to create a landscape where both can co-exist as elements of the global steamroller that is Bluetooth.

The SIG's official line – and we will use mostly the SIG's own words here to avoid any confusion or misinterpretation - is that it is developing an innovative method of radio substitution. It will allow the well known Bluetooth protocols, profiles, security and pairing to be used in consumer devices while achieving faster throughput with momentary use of a secondary radio already present in the device (Ed. – that radio being a Wi-Fi radio). This architecture, called 'Alternate MAC/PHY' by Bluetooth SIG members working on the specification, is taking on a two-phased approach as SIG member companies drive the specification forward.

SIG exec director Mike Foley observed, "This is the wireless technology equivalent of 'low hanging fruit'. What we're doing is taking classic Bluetooth connections – using Bluetooth protocols, profiles, security and other architectural elements – and allowing it to jump on top of the already present 802.11 radio, when necessary, to send bulky entertainment data, faster. When the speed of 802.11 is overkill, the connection returns to normal operation on a Bluetooth radio for optimal power management and performance."

And what of UWB, and the agreement with the WiMedia Alliance? According to the SIG, development work continues between the two organizations in advance of widespread UWB adoption – expected to be co-located in many Bluetooth devices. "We're committed to speedy wireless personal area network connections and we'll always be looking for the best near term and long term way to accomplish that," added Foley. "The greatness of a generic alternate radio architecture being developed is that it's adaptable." The core specification enabling the Alternate MAC/PHY is expected to be published to members in mid-2009 with work already well underway.

That is the SIG's view, but we were left wondering how the WiMedia companies felt? Incisor contacted Stephen Wood, president of the WiMedia Alliance for comment. Wood didn't seem too troubled, and told Incisor, "The Wi-Fi community has recognized that there is a material opportunity in PAN applications. As such, there is an effort by manufacturers who have 802.11 products to try to adapt them to address the PAN market. A lot of those players are represented within the Bluetooth SIG. My understanding is that Bluetooth is attempting to accommodate the diverse interests of its members with this announcement."

And was there any truth in the accusations that UWB was late coming to market? Not according to Wood. "As to the specific assertion that UWB is behind, that would appear to be unfounded. Just last week, the first three WiMedia radios were certified for operation above 6 GHz. This is hitting the schedules which were agreed with the SIG. The pieces which remain for both technologies include PAL development and test development. I'm not aware of any discernable time to market delta between the two at this time. It might be interesting to try to collect quantitative data about specific deliverables."

Wood threw one new ingredient into the melting pot, commenting, "There is also a tendency by Wi-Fi advocates to understate the challenges of making Bluetooth over Wi-Fi work (both technical and political) for obvious reasons. I'm not sufficiently knowledgeable to speak on this point, but topics that I have heard mentioned include the simultaneous use of PAN and LAN (not currently possible), tradeoffs between radio throughput, antenna design and power consumption, RF interference potential to related technologies such as WiMAX that is presently unresolved, and return rates of Wi-Fi due to ease of use challenges."

"WiMedia believes that UWB is and will remain an excellent choice for handheld designs and is continuing to work to improve our radio designs for handheld applications," Wood summarised. "It was designed for maximum simplicity, low power consumption and low cost. We will continue working to improve these features further."

So, if it is unhappy, the WiMedia Alliance isn't admitting it. Perhaps the Bluetooth SIG's PR skills extend to keeping everybody happy, whatever is going on. Oh, and the views of the Wi-Fi Alliance are unknown at this time, as an invitation for its exec director to comment went unanswered.

Here at Incisor we are tempted to speculate that the Bluetooth/80.211/UWB situation would have been handled less well by other parties. Nobody mention the IEEE …The Bluetooth SIG does seem to have a knack for pulling rabbits out of the hat, or at least to be able to manage its PR very well indeed. No doubt there have been some intensely difficult conversations going on behind the scenes, not to mention a certain amount of hair-pulling, hand-wringing and possibly some throat-punching. We can't say whether there is a connection, but the Bluetooth SIG does now have a new chairman. The key thing is that from the outside none of this has been visible, and the SIG appears to have successfully steered itself through a minefield once again.

It seems that frying pan manufacturers are not the only ones to have benefited from the US space industry's development of the non-stick miracle product that we know by the name of Teflon.

Copenhagen airport pushes Bluetooth info service

THEY ARE VERY INNOVATIVE, THOSE SCANDINAVIANS, AREN'T THEY? AND SEEMINGLY ALWAYS AT THE FOREFRONT OF WIRELESS DEVELOPMENTS, INCLUDING - OR PERHAPS ESPECIALLY - BLUETOOTH. PERHAPS THE TV IS AWFUL IN SCANDINAVIA, AND WE ALL KNOW THAT THE DRINKS ARE EXPENSIVE, SO OBVIOUSLY THERE IS NOTHING TO DO BUT CONCENTRATE ON INVENTING THINGS. →

No surprise then that it is Copenhagen airport that is pushing the boundaries again. A bulletin from its operators tells us that they launched a new information system during February that would be fully operational in just over a year's time. What's more, a survey shows that 74 percent of passengers will take the opportunity to register for it.

What, then, is this service? It is all about answering those questions that we ask ourselves when we are killing time at the airport - when shall I leave for the gate? What is the weather like, at my destination? Do I need to buy the wife a present? Have they seated me next to the woman with the baby? Well, probably not the last two. Passengers at Copenhagen airport will be able to receive answers to the serious questions and more on their mobile phone by registering for these free services on the website of the airport. Also unsurprisingly, it will be passengers flying with SAS that will be the first to receive this new airport experience.

The wireless technology system registers a mobile phone entering into a new zone via a combinations of different technologies. The system was created by the development group SPOPOS. It's not just about looking after the traveller, though, and BlipZones, from Blip Systems (which is part of SPOPOS), enables the capture of statistics relating to the flow of people through the airport. For some time, BlipZones has gathered statistics from terminals 2 and 3 at Copenhagen Airport, enabling the airport to measure queue length at security and gather flow data.

Blip Systems, as some Incisor readers may remember, is a privately held wireless technology company based in Aalborg, Denmark. It was founded in August 2003 as a management buy-out of the Bluetooth activities within Ericsson Denmark. Blip Systems was established with a view to using new connectivity possibilities in mobiles such as Bluetooth and Wi-Fi to deliver proximity services. The development of what is now known as BlipZones began in 1999 at Ericsson, and the product was transferred to Blip Systems.

Everybody wins

It seems that all parties are fired up about the launch. A Copenhagen Airport spokesperson commented, "We are constantly investing in new technologies, which will improve the conditions for our passengers and our business partners. The technology is being implemented to provide a calmer and more relaxing start to their journey. Passengers will receive a message on their mobile when they need to start going to the gate, depending on their actual location in the airport. The airlines can actually use the information to decrease the amount of delays, because they will be informed of the location of their passengers and if it is possible to be at the gate before departure."

The airlines will benefit too. Niels Hemmingsen, an SAS director in Denmark remarked "To the airline companies it will be of great benefit to optimize the boarding process. We cannot fly until we can fully match all the passengers with the luggage, so if one or more passengers does not reach the gate for boarding time, then we need to find those passenger's luggage, before we can close the gate and take-off. With the new technologies, we can find out where those passengers actually are, so we can contact them or gain more time to deal with the luggage."

Under the bonnet

Blip Systems has developed two new modules for its Bluetooth location-based mobile system, BlipZones, which enables dwell time measurement in a certain area as well as flow analysis between different areas. The dwell time module can analyze dwell time in a certain area, which is useful for queue management, but can also be used to measure average shopping times in a store or exposure time to marketing. Advanced functionality like prediction of queue times, based on flow in adjacent zones is also available.

The flow analysis module measures the movement between zones, and provides a tool to optimize the physical environment or detect the most likely movement pattern from a certain starting point. This is a feature that would be equally as important to a shopping center, as it is to an airport.

Blip Systems says that the new development to BlipZones means that the product has become more than an intelligent mobile marketing tool – it is also an efficient analytical tool, making it possible for the location owners to gain further information for staff requirements, security purposes, visiting information and flow diagrams, etc.

So there we have it. Developing clever systems such as this to make the life of international travellers easier is the sort of thing that Scandinavians do to fill their time. With long winters, expensive drinks and awful TV, it makes sense really.

Mind you, they do have a lot of stunning women in Scandinavia.

Er, guys ……

'With the new technologies, we can find out where passengers actually are'

wi-fi / wlan news

Star-bucking, across the USA …

T-Mobile found itself staring at the bottom of an empty coffee cup as former buddy Starbucks Corporation announced a comprehensive new communications agreement with AT&T Inc. Starbucks is teaming with AT&T and will start offering a mix of free and paid wireless Internet service in most of its U.S. coffee shops, beginning this spring

AT&T has provided Starbucks with network connectivity for point of sale and other store operating systems for more than 10 years, and will now be able to offer consumer Wi-Fi service in more than 7,000 Starbucks locations in the U.S.. Starbucks said it will give customers that use its Starbucks purchase card two hours of free wireless access per day. After that, it will cost $3.99 for a two-hour session. Monthly memberships will cost $19.99 and includes access to any of AT&T's 70,000 hot spots worldwide.

Nearly all of AT&T's broadband Internet customers, about 12 million of them, will automatically have unlimited free Wi-Fi access at Starbucks, the companies said.

And what of the installed base of previously happy T-Mobile Starbuckers? T-Mobile has been Starbucks' Wi-Fi partner for six years, but did not include free Wi-Fi and charged more than the new AT&T service will cost. Presumably still keen to relieve T-Mobile subscribers of large amounts of money for questionable flavours of coffee and barn-sweepings muffins, Starbucks is doing it's best not to upset them. It is promising that T-Mobile HotSpot customers will be able to continue to access Wi-Fi services at no additional cost, through an agreement between AT&T and T-Mobile.

Customer Wi-Fi services from AT&T will be rolled-out to Starbucks locations in the U.S. on a market by market basis beginning in the spring of 2008.

Market supports Wi-Fi Alliance security measures

… and WFA adds support for NFC in set-up

More than 200 products have achieved the Wi-Fi Alliances' Wi-Fi Certified seal of approval for Wi-Fi Protected Setup. This program, launched in January 2007, helps consumer and small-business users more easily install decent levels of security for their Wi-Fi networks.

Products certified for Wi-Fi Protected Setup include dual-mode Wi-Fi/cellular phones, Wi-Fi enabled printers, and more than 80 products featuring next-generation Wi-Fi Certified 802.11n draft 2.0 technology (as an aside, when, oh, when, will .11n become a proper – not draft – standard, we wonder?). More than half of the devices are apparently also certified for WMM (Wi-Fi Multimedia) Quality of Service, which optimizes them for voice, gaming, and multimedia applications.

The organization has also launched testing support for NFC (Near-Field Communication) as an additional Wi-Fi Protected Setup network configuration tool. In the NFC method, a user touches a card or token to designated areas on an access point and a client device to connect them. NFC joins two previously-tested mechanisms, push-button and PIN entry, to simplify the process of joining devices to a security-enabled Wi-Fi network.

The Wi-Fi Alliance suggested that - like the push-button method - the NFC technique is especially useful to connect devices that don't have a keyboard-oriented user interface, such as cameras, gaming devices, and other consumer electronics.

This move means that both the Bluetooth SIG and the Wi-Fi Alliance are now embracing NFC as a compliment to their technology portfolios. Perhaps it is time to buy stock in some NFC companies …

Sierra, Becker, umc keep seamen in touch

Sierra Wireless and Becker Marine Systems Communication tell us that Becker Marine Systems has integrated the Sierra Wireless MC8780 and the MC5725 embedded modules into its umc.connect communication server.

This is aimed at mariners worldwide who stay in touch using the Becker Marine Systems Communication umc.global network. The network combines wireless LAN, cellular communications, and satellite communications into a single transparent global network and accompanying on-board communications system that can be accessed by seagoing vessels. As part of this on-board system, the embedded Sierra Wireless modules provide a 2G or 3G broadband mobile data connection for vessels near shore or in ports around the world.

"The umc.global network managed services provide huge cost savings for ship2shore and shore2ship communication, since it roams seamlessly between any satellite service towards any 2GSM, 3GSM and wireless LAN service available. The Sierra Wireless MC8780 has been proven as the most robust and flexible module for the very harsh environment on seagoing vessels," stated Thomas Mueller of Becker Marine Systems Communication.

The MC8780 embedded module offers tri-band UMTS/HSPA and quad-band GSM/GPRS/EDGE network access for roaming on mobile broadband networks worldwide. The MC8780 also offers Receive Diversity and GPS support.

Sierra Wireless' embedded modules have been designed for integration into notebook computers, fixed wireless terminals, and other devices requiring high-speed wireless connectivity.

wi-fi / wlan news

Municipal Wi-Fi market abandoned by EarthLink

The large-scale, city-wide roll-out of Wi-Fi networks and the creation of MVNO businesses is a goal for many, whether they are city managers keen to install an (almost) USP for their town, network operators looking to increase data traffic, or profit-hungry system integrators eyeing the massive contracts with interest that borders on naked lust. However, making it happen isn't so easy.

Incisor has reported on a number of occasions on the exploits of US ISP EarthLink, which has been very active in this area, and yet has struggled very publicly to succeed. For some time it has seemed that EarthLink could either become a model of success in the muni-Wi-Fi and MVNO market, or it could be an example of a company that took too many risks. It appears the latter has happened.

Following the death in January 2007 of original visionary, CEO Gary Betty, who had the will to make a success of the muni-Wi-Fi project, replacement CEO Rolla Huff came in and ruthlessly separated wheat from chaff. It almost certainly had to be done. EarthLink has been haemorrhaging money from these ventures. EarthLink's most recent earnings report said it lost $80 million in 2007 from municipal operations, including a $28 million impairment charge that wrote down the municipal assets' goodwill. The ISP also took an $111 million hit from Helio, its MVNO joint venture deal with SK Telecom.

And so the time has run out. EarthLink is no longer blazing the muni-Wi-Fi trail, and has other problems to resolve in its core business if it is to survive.

Quite where this leaves the overall market is unsure. EarthLink's activities were being seen as a model for others, and without doubt there are still many out there on either side of the commercial fence that would like to see city-wide Wi-Fi availability. One thing is for sure. If you are setting out to do this, you need hugely deep pockets, very long arms, huge amounts of patience and a steely – nay diamond-hard – resolve.

Real-time video over Wi-Fi

ProVision Communications was showing real-time multicast video streaming over Wi-Fi at Mobile World Congress. This has been developed under the UK government sponsored project VISUALISE, and is designed to allow spectators at outdoor sporting events such as motor rallying and equestrian events to view personalised action from other vantage points on the course on their own handheld terminal.

The elements developed by ProVision comprise a DSP-based H.264 module for the real time encoding and wireless transmission of video from a camera, and a software-based decoder platform that allows it to be received on a PC, PDA or smartphone. The H.264 codec is optimised for use over wireless networks conforming to Wi-Fi (802.11), WiMAX (802.16), and DVB-T standards. It has been developed in software for use on DSP/FPGA platforms or under the Windows O/S.

The encoded video signal is transmitted and received through an integrated IEEE 802.11b/g modem that incorporates antenna diversity.

Big opportunity to sell FMC to SMB

The potential for sale of IP-based technology to small and medium-sized businesses (SMBs) is substantial, according to recent market research commissioned by Nortel.

Fifty percent of SMBs surveyed have voice networks three or more years old, and despite the fact that nearly half characterize themselves as "early adopters" or "on the leading edge of new telecommunications technology," only 40 percent have actually implemented VoIP or any IP-based mobile convergence solution.

"The research clearly indicates a great opportunity for service providers to target SMBs," said Alf deCardenas, general manager, carrier multimedia networks, Nortel. "Our solutions are designed to help them deliver a full range of simple solutions for SMBs that easily allow carriers to offer advanced SIP applications without the cost or complexity often associated

The research, conducted with RONIN Corporation, included a web survey of approximately 900 SMB and Enterprise decision makers across the United States, France and the United Kingdom. It was designed to gain insight into SMB perception and use of VoIP, along with SIP applications like click-to-connect and converged mobility for Wi-Fi and cellular calling from dual-mode handsets. The value SMBs place on SIP services and the impact of pricing on service adoption were also assessed.

Among other findings, the research found that:

- SMBs are more likely to go to service providers than resellers for voice hardware and Internet services.
- Converged mobility - the ability to make phone calls over Wi-Fi and cellular networks via a dual-mode phone - is the service SMBs are most likely to consider for implementation followed by web services like click-to-connect and converged desktop applications that allow you to easily control calls from any cellular phone using a laptop application.

Nortel was demonstrating SIP applications like converged mobility and web services in a real estate business scenario at Mobile World Congress 2008 in Barcelona.

University deploys largest 802.11n wireless network

Cisco tells us that Duke University in Durham, North Carolina, will deploy an expansive next-generation 802.11n wireless network across its campus, featuring more than 2,500 access points – and claims that this is the largest planned 802.11n wireless network in the world by any organization to date.

Duke will blanket more than 6 million square feet of its campus with 2,500 Wi-Fi-certified Cisco 802.11n access points. The deployment will provide wireless coverage in academic halls, libraries, residence halls and other campus buildings.

Duke's chief information officer, Tracy Futhey, said 802.11n technology is a fundamental part of Duke's strategy to implement technologies that can enhance the quality of life for a campus population of 45,000 students, faculty and staff.

"Wireless on our campus is absolutely critical to our 24-by-7 population. Universities are an ideal testing ground for new technologies, especially wireless uses and devices," said Futhey.

Wi-Fly from AA and Aircell

There are plenty of us that are grateful that in-flight voice-calling has not become more popular – despite most airlines offering the service, not many people seem to use it. We would, though, like to be able to have Internet access, and signs are that this may be getting closer.

American Airlines, we are told, has completed the first aircraft installation of the Aircell Internet broadband connectivity solution at its Kansas City maintenance base. American claims that it will be the first U.S. airline to offer customers Aircell's Internet broadband solution, and plans to install and test the technology in 2008 on all 15 of its Boeing 767-200 aircraft, which primarily fly transcontinental routes.

"There's a tremendous amount of intrigue and appeal for travellers to be able to utilize the Internet when travelling 30,000 feet above the United States at 500 miles per hour," said Dan Garton, American's executive vice president – marketing.

"Connectivity is important to our business customers and those who want to use their PDAs and laptops for real-time, full-service, in-flight, broadband Internet, e-mail and VPN.

Prior to customer use, the first aircraft featuring Aircell's broadband Internet service will begin flying for rigorous systems and beta testing pending certifications from the Federal Aviation Administration (FAA).

So, what will we be able to do? Apparently, Aircell's air-to-ground broadband system will provide passengers with an Internet connection, VPN (virtual private network) access, and e-mail capabilities through all Wi-Fi-enabled laptops, PDAs and portable gaming devices. Customers will – it is promised - experience speeds similar to wireless, mobile, broadband services on the ground. There are limits to the joy for mobile warriors though - the Aircell system is designed to provide only a data service – cell phone and Voice Over IP (Internet Protocol) services will not be available. Shame, that. Perhaps the airline makes a lot of money out of in-flight calls …

Aircell's broadband service will also provide complimentary access to AA.com including services such as gates and times, fares and AAdvantage information, access to the Wall Street Journal Digest Edition, compatibility with VPNs that provide access to corporate intranets and email accounts and what is described as 'seamless coverage' over the continental U.S. above 10,000 feet.

This would appear to be a classless offering. You might expect that the people who typically turn left when they board the plane will get their Wi-Fi Internet access for free, but this not the case. Everyone will pay. Aircell states that it will offer the connectivity solution to American Airlines customers in all classes of service on the B767-200 aircraft - for a fee. Pending successful connectivity trials on B767 aircraft, American may extend Aircell's in-flight broadband service to the remainder of its domestic fleet.

More antenna than NASA

Aircell's air-to-ground in-flight Internet system for commercial aircraft uses three lightweight antennae installed on the outside of the aircraft. One antenna, the PCS/GPS antenna, is mounted on the top of the aircraft, and the other two antennae are mounted to the bottom of the aircraft. Customers access the broadband signal using their own Wi-Fi - enabled devices, which communicate directly with wireless access points that are distributed evenly throughout the aircraft cabin ceiling. The signal will be transmitted through the 3 MHz signal from air to ground using 92 cellular towers throughout the continental United States. The installation work of Aircell's equipment will be performed by American's mechanics.

Maybe, just maybe, the availability of Internet access will distract those few gabblers who do insist on talking their way through a 12 hour flight. Then we just need to get peanuts re-instated with the in-flight drinks.

Less wires means more patient care

Less wires means more patient care

Joseph Brant Memorial Hospital (JBMH) is a mid-sized hospital, situated west of Toronto. At present, the hospital has 265 inpatient beds and annually records 13,800 admissions, 46,000 visits to the emergency department and 1500 births.

As a full-service, community-oriented hospital, the importance of bedside patient care is paramount to the hospital's level of service. With the advent of new healthcare applications that allow hospital staff to spend more time with patients and families and less time entering data into computers, the reality of meeting this demand has become easier. It was decided that these applications are best run on mobile computing devices that give healthcare workers freedom from their desks and allow them to work at the bedside. In the case of Joseph Brant, the hospital had a dietary application that it had wanted to implement for its dieticians to use at the bedside, but the hospital had no wireless infrastructure.

Because the building is structurally dated, when IT staff at the hospital decided to implement a structured wiring solution throughout the facility, cost and complexity prevented the team from installing network drops in the hospital's patient rooms.

On top of the physical limitations of the hospital's bricks and mortar, Denis Burella, director of IT and communications services at JBMH explained that the IT department had inquiries from pharmacists, dieticians, nursing staff, and physicians about applications that would allow them to spend more time with the patients.

Before the application was implemented, everything was pen and paper. The dieticians would manually review patient charts, sit down and conduct nutritional assessments, review the dietary options with the patient, manually calculate nutritional requirements and go back to the computer station to input the information. "That took time, and it wasn't efficient. Less time is committed to hand customizing therapeutic diets, eliminating a lot of the manual work. There is less room for error and more time is available to meet with the patients themselves," said Burella. With the dietary software program up next on the IT department's list, it was a natural fit to implement a wireless solution throughout the entire hospital in order to meet the needs of the hospital's staff. Burella explained: "We tied two projects together in order to achieve connectivity throughout the entire building. This is the first facility in Canada to use the wireless infrastructure for our particular Windows-based dietary software."

Network Solution

JBMH chose to work with Cisco partner UNIS LUMIN, which has managed its networks for nearly a decade. Joseph Brant installed a total of 131 Access Points (APs) at its site. The APs were installed on all seven floors of the hospital, giving it complete penetration throughout the entire campus. Joseph Brant is currently planning to install further APs at the adjacent long-term facility to provide wireless access for users.

To secure the network, Joseph Brant is using an Access Control Server (ACS) and a Wireless Control System (WCS) to manage the wireless LAN. It is widely known that security is a critical concern in the healthcare environment because of legislation protecting patient information and the sensitive nature of patient information.

Although all of the clinical laptops - such as those used by the dieticians - don't leave the hospital, non-clinical laptops, including those brought in from outside the hospital by physicians, must be verified as using the proper antivirus software and security credentials before they log-on to the network.

ROI not in $s

The wireless network is used by 16 nutrition and food service staff to access the dietary software and current ADT system, via 9 tablets. The feedback on efficiency, time-savings, and patient satisfaction has been unanimously positive. "In healthcare, ROI doesn't return dollars; it improves patient safety and satisfaction," commented Burella, "and our wireless infrastructure will certainly pay benefits in that regard." Future applications for addition to the wireless network include uploading nutrition information from the dietary software program directly into the EMR.

The wireless service is also available at no charge to the facility's physicians and to the public for a small fee. This has benefited patient visitors by allowing them to stay in touch with their home or office by being able to access virtual private networks and to stay in touch with family members who are not able to visit patients in the hospital due to distance. In one case, the Burlington Post wrote about how a mother of a patient was able to use a web cam and MSN to communicate with the child's father who was in New York City.

Next steps

The implementation of a wireless network throughout Joseph Brant's campus has opened up the possibility for other applications that will further benefit patient bedside care. "The wireless infrastructure has pretty much laid the foundation for us to move forward," said Burella. "It's one of the most important pieces for us, because there are other technologies that we can't implement without it."

Joseph Brant is currently looking at providing its pharmacists with portable devices so they can provide the same level of service at the bedside as the dieticians. The hospital is also in the beginning stages of implementing an emergency department management system that will comprise a wireless portion for triaging and quick patient assessments. This will help expedite the flow of patients in Joseph Brant's emergency department, according to Burella.

But the biggest project to come out of this implementation will be the rollout of a patient documentation system that will be at the bedside of every patient throughout the hospital. Burella believed that this will put the wireless network to the test, because it will encompass 25 nursing stations. "As we move forward on our IT vision, we realize more and more things that we can leverage from a wireless point-of-view. That points to a smart investment on our part and better things to come for our staff, patients and families."

The Box: A New Wireless Divinity

by Dean Anthony Gratton

'The Box' – also known affectionately as the television or TV. The TV has gradually evolved into a new religion boasting a prolific number of worshipers who have, through their experiences, conceived an homage; a new divinity that has become more popular than a visit to the Church. We often find ourselves asking the Lord to bless John Logie Baird for his ingenuity and moreover, thanking John for the much loved ornament that now takes pride and centre stage in the majority of our living rooms, kitchens, bathrooms and bedrooms. We would never consider purchasing an oversized sofa or coffee table that would naturally dominate any room, but with a varied number of flat TV screen sizes it does seem bigger is better for the squared-eyed consumer. From a modest 14 inches to a whopping 150 inches (see Panasonic's announcement at CES, Las Vegas with their 150" Plasma TV) and, a range of features to boot, the TV ultimately delivers a varied content potentially satisfying the dutiful religious flock. Nowadays, we can easily content ourselves by religiously tuning in, often guiltily whittling away an evening pondering the profound, all knowing, thought provoking question, "What's on the box tonight?"

Whilst some may feel that the TV is an unwanted medium perhaps corrupting youthful minds and arguably delivering content that may be considered futile, it does continue to entertain us and remains pinnacle in our social playtime. Furthermore, it has a communion of dedicated worshipers who pledge their devotion to the addictive images portrayed on the box. And occasionally, we may find ourselves conducting a frenzied attack with the remote control where we channel hop desperately wanting some kind of audio-visual fix – perhaps seeking a sense of relief and escapism banishing the constraints of our working day (absolutely nothing wrong with that!)?

However, the images on the box no longer seem to be receiving the audience's full attention – they are increasingly becoming distracted. Curiously, some consumers seem to be more concerned about what's going on at the back of the TV; at the back of the DVD player; and at the back of their set-top-boxes (STBs). Not much of a crystal clear picture here, but it seems the box is developing a wireless theme that is creating an omnipresence akin to the almighty himself. More specifically, we are talking about WirelessHD (or WiHD) and Wireless High Definition Multimedia Interface (or Wireless HDMI).

WirelessHD is a new industry specification supported by Intel, Panasonic, LG Electronics, Matsushita, NEC, Samsung, SiBeam, Sony and Toshiba. Its premise is to deliver the next generation of consumer electronic products that comprise a wireless digital interface, in turn, enabling streaming of high-definition (HD) content between a range of consumer devices. The driving forces behind the industry-led initiative instigated their notion some time ago in 2006, and have only just released (January 2008) the initial v1.0 offering. However, many new products were demonstrated at the CES Las Vegas event to christen the new-born specification. Arguably, it seems a natural evolutionarily step forward for the TV to envelope wireless technology as there are a myriad of phono connecters, SCART, S-Video leads and so on, which remain unseen (to a large extent) at the back of the box. On the other hand, "if it's not broke, don't fix it" can be said about the television. The TV has increasingly grown in size, quality and varying degrees of decreasing thickness for the flat screen, but it still remains faithful to the initial concept envisaged by Baird. Unmercifully, we all too often increase complexity for the consumer when integrating and offering wireless – all under the heading "it's a simple means of connectivity." The existing physical set-up of a TV and its

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peripheral devices can be somewhat cumbersome to complete, as the mere connection of a cable still challenges the most modest novice. The varying connectors (their shapes, sizes and function) even now leave some consumers baffled. We can only presume that with the introduction of wireless we will make things simpler, or at least we would hope.

Wireless HD has been touted around for some time. As we finger through the Incisor archives, the September 2005 issue featured an article discussing Pulse-Link's (www.pulselink.net) early CWave Ultra Wideband (UWB) Wireless HD variant. However, recently Pulse-Link was demonstrating its CWave UWB technology at the CES event, which obviously establishes an emphatic willingness and belief in the proposition of the technology. Pulse-Link is not alone – there are others out there who also believe. Radiospire (www.radiospire.com) and Tzero Technologies (www.tzerotech.com) both offer Wireless HD products and silicon, namely AirHook and ZeroWire, respectively. Both product ranges use UWB as their primary radio medium and, of course, in our previous Incisor article regarding UWB (December 2007, "Ultra Wideband: A PAN Phenomenon") we purport a technology that has now found its way within a clan of Wireless Personal Area Networking (WPAN) worshipers. Evidently, all the aforementioned companies are indeed in competition with each other; nevertheless, the box has reluctantly become a convert to the holistic religion that is a new wireless divinity.

All is not what it seems. A dichotomy of wireless religions is emerging, albeit for some time now. We have all heard the stories surrounding Bluetooth vs. WiFi and ZigBee vs. ZenSys, but this verse has taken an odd turn. Wireless HDMI is nowadays synonymous with UWB technology whereas Wireless HD uses a propriety radio technology that operates within the unlicensed 60GHz Extremely High Frequency (EHF) band. The standard offers a theoretical data rate of up to 20Gbit/s of uncompressed audio-video content. It is suggested that the bandwidth available to Wireless HD applications should be sufficient for future high-definition growth, in turn, ensuring the longevity of the technology within the intended market. Wireless HD operates in a point-to-point, non line-of-sight (NLOS) topology creating in essence a Wireless Video Area Network (WVAN) as described by the WirelessHD.org forum. Within the topology, the grouping of a 'Coordinator' and zero or more 'Stations' form the subjects of a WVAN. The characteristics that define a coordinator are that described by its ability to receive audio-video content such as a TV or Digital Video Recorder or Personal Video Recorder (DVR or PVR). A station is a device that sources audio and video content; a TV can be both a coordinator and a station.

UWB on the other hand, operates within the unlicensed 3.1 to 10.6GHz frequency band offering a theoretical data rate of up to 480Mbit/s; considerably less than the Wireless HD equivalent. More confusingly, Wireless HD and Wireless HDMI (also referred to as Wireless USB) are all bantered around in the same breath. However, further investigations illustrate that there are subtle differences, which we have already outlined, although Wireless HDMI and Wireless USB are, in essence, synonymous. Whilst there are similar parallels with both technologies, it seems the TV church choir is somewhat confused as to which hymn it should sing next. Perhaps we could argue that the immaturity of UWB in terms of legislation with the Federal Communications Commission (FCC), the International Telecommunications Union (ITU) and Ofcom, in the US, Europe and the UK, respectively, may have led to the formation of the Wireless HD industry group (established 2006) developing a wireless technology that was very much here and now, despite it taking them two years to reach their first level of maturity.

Coincidentally, UWB will undoubtedly increase in popularity, as the WiMedia Alliance has now certified a number of products and silicon in preparation for a product surge in 2008. Likewise, the WiMedia Alliance is working on increasing the theoretical bandwidth proposing data rates of up to 10Gbit/s. The Wireless HDMI variant is essentially an evolutionary step forward for the cabled technology equivalent, which has been with us for some time (circa. 2002) and has already been integrated into many consumer electronic products. HDMI as a cabled presence is supported by founders such as Hitachi, Panasonic, Philips, Silicon Image, Sony, Thomson and Toshiba. The premise of Wireless HD unequivocally mirrors the ambition that is desired by Wireless HDMI, that is, seamless wireless streaming of audio-video content to/from multiple consumer products. Despite two wireless religions offering us the same belief system, there doesn't seem to be that much discord between them. In scouring the press archives we have yet to witness a showdown akin to the Betamax vs. VHS debate and similarly, the HD vs. Blu-Ray debacle. Primarily, we need to be aware of the confusion that may ensue as a result of two technologies reaching market maturity.

As we approach the altar to kneel down and pray, and as we try to connect the myriad of cables to the rear of the TV, we ask the Lord to offer us forgiveness. For we are simply ignoring the advice given to us in the manual, which clearly shows us idiot proof images of how to wire our television, DVD and STB – we just know better. We ask for his blessing as we turn on the box in the hope that we are stimulated with a montage of images.

However, in a desperate need for this stimulus we concede prematurely to push the "On" button, as we hear a momentary power-up of the television and to our sheer disappointment we receive the sinful "No Signal" message. With a blasphemous outcry of our Lords name, we skulk and continue to curse under our breath. With Wireless HD and Wireless HDMI we can be assured of an easy transition to the new wireless divinity, although its leaders need to be aware of the pitfalls in taking away the cables. On one hand we can easily witness all of our prayers being answered, but on the other, without careful due diligence, we could possibly endure a configuration hell.

'Wireless HD operates in a point-to-point, non line-of-sight (NLOS) topology creating in essence a Wireless Video Area Network (WVAN)'

zigbee/802.15.4 news

Future-proofing Smart Metering

Smart metering is one of the principal target applications for a number of short range wireless technologies – particularly ZigBee and the proprietary 802.15.4-based competitors that it distances itself from like a bunch of un-loved, in-bred, out of state relatives. With a view to regularising this market, Iberdrola, which specialises in the use of low and medium voltage networks as a telecommunication media, has been working on the definition and testing of a new open, public and non-proprietary telecom architecture for smart metering functionality.

Iberdrola observes that new smart meters must be able to communicate securely and reliably to a central location, as well as to execute the commands and controls received. And all this becomes a daunting task, when the number of meters escalates to millions of units, and when functionality associated with smart grids requires real-time communications. In this new context, says Iberdrola, the critical issue is telecommunications.

Iberdrola has gathered the relevant national and international industry players in the areas of metering, telecommunications, and silicon manufacturing to define, test and develop an open, public and standard AMI (Automatic Meter Infrastructure), into what is called the PRIME project (Powerline Related Intelligent Metering Evolution). Current industrial PRIME partners are Advanced Digital Design, CURRENT Group, Landis+Gyr, STMicroelectronics, Usyscom and ZIV. A large number of European utilities have apparently expressed their interest in joining the project.

Iberdrola performed several tests in 2007 in different locations of its electricity network. The success of using OFDM (Orthogonal Frequency Division Multiplexing), a technology widely used in virtually any modern telecom infrastructure, such as xDSL, Wi-Fi, WiMAX, etc., has already been demonstrated in the field: a large field deployment will soon be carried out based on this new architecture.

The final objective of the project is the establishment of a set of international standards that will allow for interoperability between different manufacturers.

Ember rides high on ZigBee

Ember, which provides ZigBee wireless networking systems, had a record year in 2007 in product shipments, new customer wins and widespread commercial deployment of its technology.

Ember told Incisor that the year saw it achieve record shipments of its ZigBee semiconductors, shipping more chips in 2007 than all the previous years combined. The impetus behind this apparently came as a result of the ramp-up in commercial ZigBee-based advanced metering infrastructure and home automation, monitoring and security products its customers introduced in the past year.

Ember's hottest sector was the Advanced Metering Infrastructure (AMI) market. Ember recently teamed with "smart meter" provider Itron to help electric utilities reduce peak load demand and home owners conserve energy by using ZigBee-based wireless technology. Itron's Ember-enabled OpenWay meter and communications system have already been adopted by Southern California Edison's SmartConnect metering program. And earlier in 2007 Göteborg Energi AB chose the AiMiR AMM System from Ember-customer NURI Telecom for its AMI application, making it what Ember calls the world's first "ZigBee city," launching a plan to cover an entire metropolis with ZigBee wireless infrastructure for the metering services of tomorrow.

"Ember made a big push into AMI and energy conservation in 2007 because of the huge potential that ZigBee offers this market in reduced energy consumption and cost," said Ember CEO, Bob LeFort. "With partners who are leaders in smart metering technologies, Ember expects to be the dominant supplier of ZigBee wireless technology to the AMI industry by the end of 2008."

Home monitoring system ZigBee Certified

Cambridge, UK-based home security company AlertMe.com's broadband home monitoring and security service is the first security system to obtain product certification by the ZigBee Alliance.

AlertMe is an Internet-based service which communicates with an in-home ZigBee network. Each system incorporates a ZigBee Coordinator and twelve ZigBee Routers and End Devices which are installed around the home. It is now available in the UK priced at £399.

"AlertMe is about people-friendly technology which is easy to install even for non-technical users" said AlertMe CTO Paul Fellows. "ZigBee is the perfect fit for our application and we're delighted to have achieved certification. ZigBee gives us an open, standards-based and future-proof platform, and our manufacturer-specific extensions make installation easy.
We are now working with other ZigBee companies - and with companies new to ZigBee - to extend our platform and offer new services."

AlertMe uses Ember's EM250 ZigBee system-on-chip and EM260 ZigBee networking co-processor together with the EmberZNet PRO 3.1 software. This is a ZigBee PRO "Golden Unit" platform offering benefits such as security and scalability, reliability and resilience, and long battery life in devices throughout the home.

NFC / RFID news

No more KFC – get NFC

Innovision Research & Technology has announced the winners of its NFC Innovation Awards, the first UK-based competition to find the most innovative application of NFC tags for the everyday mobile handset user.

The competition required UK-based academic teams of up to four participants to produce an abstract proposing a novel NFC application using the firm's Topaz tag and an NFC-enabled mobile handset. The three finalists were all from UK universities.

'Health Buddy'
There were two joint winners. One was 'Health Buddy' from the Lancaster University team of Paul Coulton, Omer Rashid and William Bird. This uses NFC to encourage outdoor physical activity or 'green exercise', as a way of combating the increasingly sedentary lifestyle of the UK population.

Health Buddy tracks the activity and progress of a user on a set exercise course, triggered each time the user scans an NFC tag at specific locations with an NFC-enabled phone. The location information provided by the NFC tags is linked to pre-calculated calorie-burning, timing and effort data for various physical activities, which could include walking, running and cycling. As well as providing an instant motivator during exercise, Health Buddy provides a historical view of activity, including distances covered and energy consumed.

Vehicle identification
The other joint winner was a vehicle identification application from Simon Moorcroft and Ben Abnett of North East Wales Institute of Higher Education (NEWI). This enables traffic officers to use an NFC handset to scan a Topaz tag affixed to the inside of a car windscreen, either as a complement to or replacement of the current tax disc. When scanned, the tag provides a unique reference which the phone uses to retrieve information from a central database. This would enable officers to confirm the details in a matter of seconds rather than the 20 minutes or so it takes today.

Healthcare application
In third place was a mobile NFC and healthcare application from Abhishek Singh and Siddarth Siddarth at the University of Dundee. This uses an NFC-enabled phone as a way of automating the process of collecting prescriptions from a pharmacy and reminding patients when it is time to take their drugs.

Innovision Research & Technology's CEO, David Wollen commented, "What is key to opening up such applications is the availability of NFC functionality in common mobile handsets, with inexpensive non-proprietary tags easily available, as opposed to the proprietary implementations that were possible previously."

RFID will save you money - or your money back

For companies wishing to take advantage of Radio Frequency IDentification (RFID) technology, yet not fully confident in the potential business case, UK company Intellident might just have the answer. In a bold move for the industry, it is now guaranteeing a positive Return on Investment (ROI), or it will refund the entire purchase cost of the project.

As Jim Hopwood, Managing Director of Intellident explained: "Our experience in deploying RFID solutions across a range of industries has provided us with the confidence to offer this guarantee to our customers. Without fail, every installation has delivered the benefit and positive returns that we planned, with many of our customers having made their investment back in less than six months. Giving our customers this guarantee simply takes the risk away and gives them the ability to really look at how this enabling technology can drive significant process improvements into their business and deliver a real return on their investment."

Intellident installed its 600th live RFID installation during December 2007, and so feels pretty confident that is has now built up an adequate knowledge-base on how customers can calculate and realise a business case for RFID.

Hopwood added: "We're not guaranteeing that every single company can build a solid business case for RFID, but if we are given the chance to understand the processes within a business, and both parties wish to proceed, then we will take the risk by laying our reputation and project costs on the line."

Bold talk!

NFC Development test tool from AT4 wireless

Spanish company AT4 wireless is launching an upgrade to its Rider test system, which will now also cover testing for Near Field Communication NFC technologies operating in the HF band (13.56 MHz). The Rider tester includes capturing and generation functionalities, avoiding the use of digital scopes or arbitrary waveform generators for measuring RF and Protocol parameters over NFC devices.

In its first iteration, the Rider NFC supports the ISO standards on which the NFC technology is based, i.e. ISO/IEC 14443 Type A & B and ISO/IEC 18092. Beyond that, and in order to cover existing design and verification testing needs beyond the conformance testing scope, an R&D version of this tester is available too.

"Supporting this new emerging NFC technology gives us an even wider portfolio of test solutions for wireless technologies, especially in the mobile communication field. NFC technology clearly represents an important innovation," commented Angel Romero, test systems product manager at AT4 wireless. "Integrating different instruments' capabilities into a single box and supporting conformance and R&D testing functionalities will allow us to extend our market objectives beyond the conformance testing business."

RFID keeps track of those On Golden Pond

Delta View Habilitation Centre is a residential care facility in Delta, British Columbia. The facility cares for seniors and others who are no longer able to safely live independently in their own homes. Delta View maintains a ratio of one care giving staff member for each six residents across a two-building campus, each housing 40 beds.

Delta View required a solution that would allow staff to track the location and ensure the protection of assets such as wheelchairs, tablet PCs and oxygen pumps, as well as the facility's residents. Salim Devji, Delta View's Assistant Administrator and Director of IT and Plant, got the inspiration to set up a wireless tracking system based on RFID radio frequency identification (RFID) technology after seeing a Cisco wireless phone being used to track assets.

The nuts and bolts

Delta View worked with Boardwalk Communications, a British Columbia-based network integrator, to create a plan that linked the facility's business objectives with technology solutions. Delta View decided to replace its old network with a new Cisco Medical Grade Network.

Delta View and Boardwalk began implementing the Medical Grade Network in 2007 by securing their network perimeter with an Adaptive Security Appliance. Once the network perimeter was secure, LAN switches were implemented.

With a secure local area network in operation, it was time to implement over 100 wireless access points, which communicate with a WLAN Controller. The access points provide 100 per cent coverage within Delta View's facilities.

The last step in the plan was implementing the Wireless Location Tracking System. There are several business benefits within the system. Delta View staff wear tags from Vocera Communications around their necks to contact each other using wireless IP telephony. Delta View residents who have what are politely described as ‘excessive behaviours which can accelerate and create safety hazards for other residents and staff’ are dressed with an Aeroscout Tag. These act as RFID transmitters, allowing managers and staff to see where these high risk residents are located in real time, thereby improving safety for them and the staff.

For high value assets, Delta View relies on open standard RFID tags. These tags are also embedded in the bracelets each resident wears. Both the Vocera and RFID tags allow Delta View to track assets anywhere in the facility's two buildings, improving patient safety and service. Using location tracking software, a quick glance at a computer screen shows exactly where the tagged resident is located on a map of the site, or where the resident has been and when.

Sponge bath for Room 115 ...

The RFID system provides many benefits, says Peter Gosniak, an Account Manager with Boardwalk. These include improved safety for residents and staff, better security for assets such as tablet PCs and wheelchairs and enhanced productivity from Delta View's employees. "Knowing where health care staff is physically located is extremely helpful in the process of determining which employee should be called to the scene when help with a resident is needed. The number of steps that are saved by being able to identify who is physically closest is a big time saver - and also ensures that the resident is taken care of in the fastest amount of time possible," says Gosniak.

In the future, Delta View plans to integrate video into its network for applications such as video telephony and security. Additionally, plans are in the works for an alarm to be activated when a RFID-tagged asset leaves the building, protecting residents from inadvertently wandering off, as well as preventing valuable equipment from being removed from the premises.

events

DATE	EVENT	LOCATION	NOTES	LINK
March 31 2008	Pheonix, Arizona, USA	Bluetooth SIG All Hands meeting	-	www.bluetooth.org
April 1 - 3 2008	CTIA Wireless 2008	Las Vegas Convention Centre, Las Vegas, Nevada, USA	-	www.ctiawireless.com
April 16 - 17 2008	Comms Solutions	Wembley Stadium, London, England	-	www.comms-solutions.com
May 13 - 15 2008	EURO ID 2008	EXPO XXI, Cologne, Germany	Application options for RFID and barcode systems	http://www.euro-id-messe.de
May 25 - 27 2008	International CES Hometech	Dubai, United Arab Emirates	-	http://www.messefrankfurtme.com/hometech/site/index.php
July 10 - 13 2008	International SinoCES	Qingdao, China	-	www.sinoces.com/en/index.aspx
2009				
Jan 8 - 11 2009	International Consumer Electronics Show	Las Vegas, Nevada, USA	-	www.cesweb.org
Feb 16 - 19 2009	Mobile World Congress	Fira de Barcelona, Spain	-	www.mobileworldcongress.com

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