Shaping the Office of the Future

Since the launch of Bluetooth™ wireless technology in 1998, much has been written about the technology, ensuring that Bluetooth is one of the highest profile new technologies in existence. We have seen the high expectations phase, when it was widely expected that Bluetooth would answer all our communications problems in the office, the car and at home. Now, three years on, we are beginning to see some truly valuable Bluetooth business applications being brought to market.

PAUL ØSTERGAARD

Yet Bluetooth is only three years old – many of the older standards, which are being championed as rivals to Bluetooth are only coming to fruition now, some up to ten years after their original launch.
Bluetooth's development can be traced back to 1994, when researchers working for Ericsson began to work on connecting cell phones without using cables. They turned to radio waves for the solution. Unlike infrared, which had been used in the past to connect devices wirelessly, radio waves can travel through walls and in many directions at once, up to a distance of 30 feet. Additionally, it was discovered that Bluetooth used little power – crucial when connecting devices which usually run on batteries.
1998 is often quoted as the year when Bluetooth development really picked up. It was then that Ericsson assembled a Bluetooth Special Interest Group (Bluetooth SIG) to develop the technology for the general market. Some of the first members to the group were IBM,

Toshiba and Intel. It was Intel who came up with the term Bluetooth – likening the technology to the 10th century Scandinavian King Harald Bluetooth who unified Denmark and Norway.
Now the Bluetooth SIG numbers around 2800 members and includes companies developing solutions at each of the Bluetooth levels, including service providers, software infrastructure (such as Norwood Systems), mobile devices, stacks and silicon. With this many major technology players, Bluetooth has already built a tremendous momentum and is set to become the ubiquitous wireless standard having a significant impact on all our lives. Forrester Research predicts there being more than 200 million W-LAN and Bluetooth-capable devices in use by 2006, with Bluetooth devices outnumbering W-LAN devices 10-fold by 2004. Another industry commentator, the research firm Cahners In-Stat, is even more bullish, "… the emerging Bluetooth market will shine. The high-tech market research firm forecasts that demands for Bluetooth-enabled devices will provide substantial opportunities for the technology with Bluetooth-enabled equipment shipments soaring to 955 million units in 2005, a 360% five-year compound an-

nual growth rate (CAGR). The semiconductor opportunity in this area will also be substantial as Bluetooth radio and baseband silicon will rise to $ 4.4 billion in 2005."

Data and Voice, Connectivity, Convenience and Cost savings

One of the key growth areas identified for wireless networking is in the office environment. Connectivity is the raison d'etre of today's office networks, but at present employees are tied to their desks. If they happen to be in a meeting or at a colleagues' desk for some time, then calls and data do not reach them. This can lead to lost productivity and increased latency in responding to key events or information. With ubiquitous connectivity, businesses can increase contactability, productivity and efficiency at the same time as reducing the cost of IT and telecoms within the office environment.
For example, imagine at the end of a meeting connecting in real-time to your office diary and being able to check the most up-to-date version for an available time to schedule the next meeting. Or, knowing that when that crucial call does come in you can be reached anywhere in

the office. Likewise, being able to access your CRM application in real time without having to wait until you are back at your desk.

It is not hard to see a vision of the future where the standard office allows people the freedom to receive and make calls anywhere in the office if they choose. This "voice anywhere" capability will dramatically reduce the costs to the enterprise.

Finally and perhaps most crucially, research shows that at present around 20–30% of mobile phone calls are made in the office when landlines are also available, incurring the expensive tariffs of mobile operators. It is possible today to deploy a Bluetooth infrastructure to direct calls to the landline seamlessly to create a wireless office network that will cut this expense immediately (fig. 1). An example where this works very effectively is in an organisation where the employees are constantly on the move within the office, in meetings or travelling between different sites, such as financial services and professional services companies. Such organisations often employ flexible working practices such as hot-desking to make the most of the resources they have and would benefit from such a flexible mobility solution. Take the example of a hospital. No longer will doctors rely on one-way paging systems but will be alerted via their phone where they could provide instructions on their way to a patient. Medical notes could be accessed via a PDA saving valuable time, while calls could be made to other departments at the bedside as opposed to nurses having to leave a patient to summon help.

Or, take for example a manufacturing plant. A foreman could take calls right by the production line instead of having to wait until he or she is back in their office. This would mean much greater productivity.

Leading the Revolution

So where does this leave Bluetooth? What are the killer apps for Bluetooth? How does it fit into the communications sector? Is there a place in the market for so many wireless technologies, for example 802.11 (Wireless LAN) and DECT, will they compete or develop alongside each other?

The applications for wireless office networking seem compelling, but doubts remain whether Bluetooth can be the

leader in this revolution when many in the industry seem to suggest that Wireless LAN or DECT are far more suitable for the job. Is it the case that the wireless networking space has too many technologies competing for superiority, or is it perhaps a case of misunderstanding? Commentators have used Wireless LAN and Bluetooth as interchangeable technologies, but their origins and purposes are different. When one understands this, it is easier to see that it is not so much a question of which will win, but of how these two technologies can work side by side. Bluetooth differs from other wireless technologies most importantly through cost and power consumption. Most wireless technologies are, in short, power hungry, whereas Bluetooth is power light. In the office environment this may not matter for many applications, since PCs are usually connected to the main power supply. However, when linked to mobiles and PDAs in particular, power is a critical issue since it is supplied by batteries that are very sensitive either to surges in demand or consumption over time. Bluetooth uses very low levels of power to provide wireless connectivity. There is a great deal of work at present into Personal Area Networking, i. e. ensuring that devices, such as headsets and PDAs are connected automatically to you as soon as you enter your office. Bluetooth is the obvious technology to support the office-wide transmission of business data, multimedia, voice and machine-to-machine data, since the devices capable of being linked to these networks are inherently small, and so power sensitive.

Bluetooth uses ultra low-power radio transmissions in the 2.4 GHz band and it

is anticipated that this low power method will make it an ideal solution for voice connectivity and low bandwidth applications. Additionally, expectations are that it will be very inexpensive, with the price of Bluetooth chips falling to around $ 5 by the end of 2002. This means that Bluetooth may well have killer applications in the domestic market as well as the business market, which will be the first major area of implementation.

On the other hand, first impressions are that Wireless LAN seems to be stealing the march against Bluetooth. Wireless LAN is a wireless Local Area Network, which instead of linking devices through an ad hoc connection of radio waves like Bluetooth connects devices directly to an established Internet network. While Bluetooth sends and receives information similar to a high-speed cable modem or digital subscriber line, Wireless LAN is comparable to a shared Ethernet link. Wireless LAN also has a much wider range, up to 300 feet, compared to 30 feet for Class 3 Bluetooth devices, but there are already some Class1 Bluetooth devices that support a range of up to 300 feet. Whilst low bandwidth may be an issue today, Bluetooth is forging ahead by developing support for 2 Mbit/s in the short term and support for 10 Mbit/s in the future.

However, Wireless LAN uses much more power than Bluetooth, making it unsuitable for connecting small battery powered devices like phones and handhelds. The IEEE, the W-LAN standards group, is working with the Bluetooth SIG to ensure a high level of interoperability and performance for situations when both radio technologies are deployed in the same
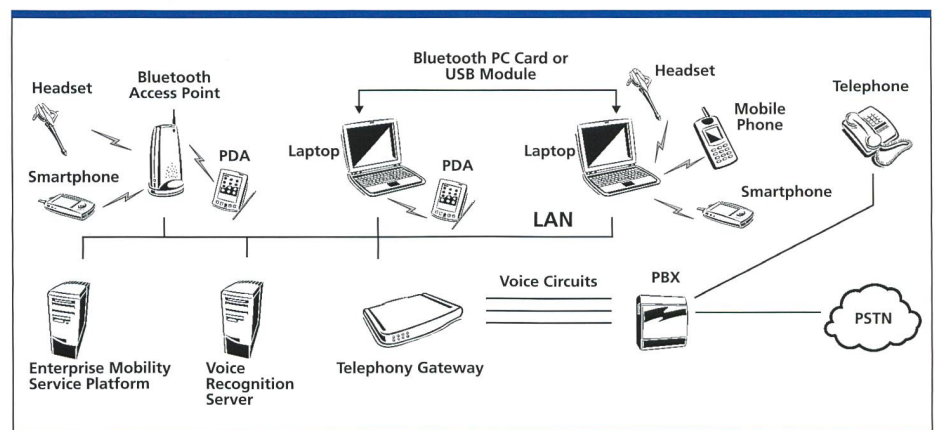

Fig. 1. Example of typical infrastructure architecture that will provide seamless voice and data connectivity to the enterprise.

environment. Through this combined work, users will be able to get untethered connectivity both to mobile devices (such as laptops), as well as to ultra portable devices (such as PDAs and phones.) Finally, there is the issue of security. Bluetooth security uses a strong 128-bit algorithm and is more secure than land-based analogue technology or indeed many current mobile systems since it is a digital platform. Already there have been cases reported of people parked in cars outside buildings accessing private Wireless LAN systems. This is much more difficult to do with Bluetooth, primarily because of the security provisions in the standard, and secondly because of its somewhat shorter transmission range. So this demonstrates how Wireless LAN and Bluetooth will both play a role in wireless networking in the future, but will have different uses. In a recent Forrester Research report, entitled "Bluetooth and W-LAN will coexist", the author, Lars Goddell stated, – "The two technologies won't compete. They'll play different roles, go into different devices and arrive at different times."

DECT

Another standard that has been mentioned as a possible competitor to Bluetooth is DECT (Digital Enhanced Cordless Telecommunications). This standard has been available for over ten years and has been on the market for the past five, with many handsets and base stations sold for domestic use. Similar to Bluetooth, DECT has some heavyweight support, being championed by companies such as Ericsson, Siemens and Philips. However, DECT requires a specific handset in the office requiring end-users to walk around with two handsets, their GSM one and a DECT one. In comparison, Bluetooth has received quite a following and already has thousands of adopters, even though it is still in its formative years, whereas support and the following for DECT is certainly weakening. On the data side, DECT is hampered by the fact that the PBX/DECT infrastructure is usually run separately to the corporate LAN. When using combined Bluetooth and H.323 standards, users are provided with access points that connect directly onto the LAN and therefore there is an easier option for integrators and network managers to install and run a unified network. Additionally, there is a vast saving on the cabling infrastructure

by using Bluetooth as opposed to DECT. DECT's roots are in voice and it certainly has good voice support. Yet even here, Bluetooth's voice quality is higher as it uses 64 KHz sampled CVSD. One major failing of DECT is that it needs a dedicated handset and base station to operate properly, whereas Bluetooth is increasingly being built as standard into PDAs, mobile phones and headsets. This would mean users could have much greater vendor choice and flexibility in selecting devices that mirror their work patterns.

DECT is a technology that has seen its day, viable in the residential voice market, but unlikely to make the crossover into the data market and the commercial environment. It certainly seems to be a mature slow-moving technology that will become eclipsed by newer standards such as W-LAN and Bluetooth, given the current following they command and the rate at which developments are occurring to both.

The Bluetooth standard is central to the future development of wireless office networking to support portable information appliances, such as PDAs and cell phones. Its low power usage makes it ideal for connecting battery-reliant devices to the office network. At Norwood Systems we believe that Bluetooth will become ubiquitous in offices around the world as more and more devices become Bluetooth compatible. This will mean that users will be able to connect into the of-

fice network via a mobile phone when in the office, making calls via the PBX on a mobile phone, or perhaps receiving emails onto a PDA whilst away from their desk. Wireless LAN may well play a part as well, but its role will be different from Bluetooth and will focus on much more power hungry applications such as connecting PCs to corporate networks. What is clear is that the office of tomorrow will be wireless – offering employees a much more flexible method of working, and for employers it will lower communications costs – both for infrastructure and call tariffs for the enterprise. As a result, Bluetooth wireless technology has a significant role to play in defining and shaping the office of the future.

6

Paul Østergaard, *Chairman and CEO, Norwood Systems*

Summary

Mit Bluetooth das Büro der Zukunft gestalten

Wenige neue Techniken machen so viel von sich reden wie Bluetooth. Zu Recht, denn vieles von dem, was nun an Bluetooth-Geschäftsapplikationen auf den Markt kommt, erfüllt die hohen Erwartungen. Bluetooth, das auf die Unterstützung der Grossen der Branche zählen kann, hat die Voraussetzungen zum allgegenwärtigen Mobilfunkstandard, der unser Leben verändern wird. Prognosen von Forrester Research zufolge werden 2006 mehr als 200 Millionen W-LAN- und Bluetooth-fähige Geräte in Betrieb und bereits 2004 zehnmal mehr Bluetooth- als W-LAN-Geräte auf dem Markt sein. Der vorliegende Artikel geht der Frage nach, welche Killerapplikationen Bluetooth zu fürchten hat und wie sich Bluetooth zu den anderen Kommunikationstechniken verhält. Ist am Markt Platz für so viele Funktechniken, für 802.11 (Wireless LAN), DECT und wie sie alle heissen? Werden sie sich gegenseitig verdrängen oder nebeneinander bestehen und gedeihen können?

Only Ericsson lets you
grow
your network
any way you want

Our inventions are turning technology into your business opportunity. Inventions like GPRS, WAP, ATM and Bluetooth. Creating the business opportunities of today. And with 30,000 patents pending worldwide, doing the same tomorrow. Another reason why the world's most powerful telecommunication companies, like Swisscom, China Mobile and AT&T Wireless, choose Ericsson. Again and again.

www.ericsson.com

ERICSSON ⟩