

WHITE PAPER

Embedded Wireless WAN in Notebooks: Hassle-Free Connectivity Anywhere, Anyplace, Anytime

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Key Message

Increasingly, work is not tied to a specific place and time. Enterprises therefore need to enable their employees to work whenever and wherever they are in order to increase productivity and employee and customer satisfaction. To be able to do this, continuous connectivity to enterprise ICT resources is needed. In order to stay connected anywhere, anyplace, and anytime, mobile workers need a range of connectivity options on their notebooks, the most important of which are Ethernet, WiFi, and cellular (UMTS or HSDPA). The wide area network (WAN) infrastructure supplying these connectivity options also needs to be available. To date, Ethernet and WiFi are embedded in virtually all notebooks, but cellular is mostly used as a detachable solution, even though cellular is available anywhere, anyplace, anytime, and Ethernet and WiFi are only available in the enterprise, the home office, and in hotspots. In addition, the use of WiFi at hotspots can compromise enterprise security.

This white paper argues that embedded cellular is a viable option for enterprises and that enterprises looking for notebook cellular connectivity options should consider built-in UMTS/HSDPA as a serious alternative to detachable options such as PC Card- and USB-type solutions.

This white paper argues that embedded cellular is a viable option for enterprises from a performance, durability, enterprise IT management, usability, cost, security, and service perspective, and that enterprises looking for notebook cellular connectivity options should consider built-in UMTS/HSDPA options as a serious alternative to detachable options. such as PC Card and USB type solutions

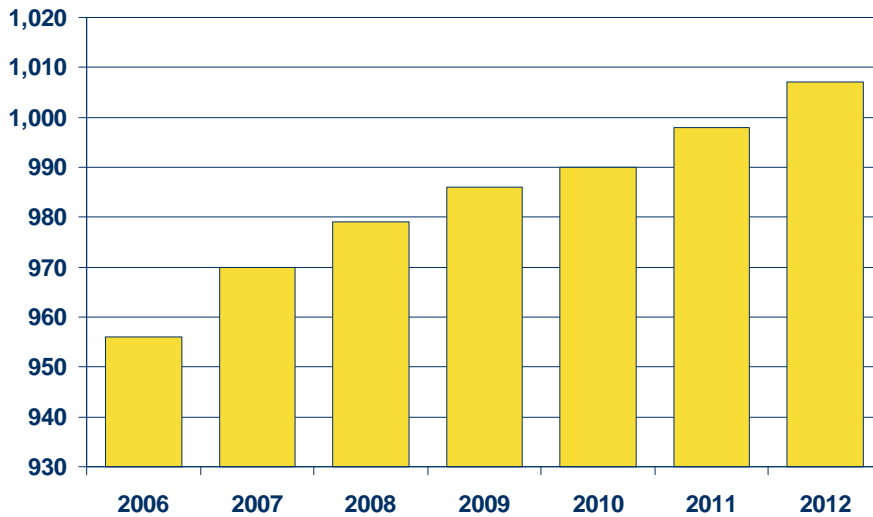
Work is Wherever you Are

In the increasingly global economy, the lines between home and workplace, occupation and recreation, and time zones and international borders are fading. No longer is the office in the city the definition of the working environment. Now your work is wherever you are. Your workplace is wherever you want it to be.

As a result there are more mobile workers today than ever and it is likely that the number will continue to grow. Figure 1 shows that IDC expects there to be nearly 1 million mobile professionals in the Netherlands in 2008. Mobile professionals are those employees that are away from their primary workplace 20% or more of the time. These employees are typically made up of traveling executives, consultants, sales representatives, insurance agents, pharmaceutical representatives, service engineers, and others, such as those in the business services, IT, and healthcare industries.

FIGURE 1

Mobile Professionals in the Netherlands, 2006–2012 (000)



Source: IDC, 2008

Mobile professionals have a need to stay connected to their company network whenever and wherever they are. In order for them to do their job as they would at their desktop office, they need to access critical enterprise IT resources and applications while on the road. Increasingly, they demand services that will enable them to conduct business the same way they are used to in the office.

Notebook Connectivity Options

Many mobile professionals will carry notebooks as their single PC of choice to be able to work outside of the office with the same efficiency as if they were in the office. Consider the workday of such a mobile professional and the connectivity options that present themselves in different locations throughout the day. Figure 2 shows a summary of location types and connectivity options.

FIGURE 2

Notebook Connectivity Options

In the Office	At Home
Ethernet or WiFi Always available	Ethernet or WiFi Always available
UMTS or HSDPA Always available	UMTS or HSDPA Always available
On the Road	On Location
UMTS or HSDPA Always available	UMTS or HSDPA Always available
Ethernet or WiFi Hardly available	Ethernet or WiFi Not always available

Source: IDC, 2008

At home he or she might start the day by reading their emails, synchronizing the agenda for the day, and preparing documents, spreadsheets, or presentation materials. In most homes today, broadband connectivity is available through a fixed Ethernet or a WiFi connection, both integrated in the notebook.

At work, the notebook slots into the docking station to get Ethernet connectivity, or stays "always on" through the integrated WiFi option in the meeting rooms.

On the road, integrated Ethernet and WiFi connectivity are less useful. Here, UMTS and HSDPA are available.

Many mobile professionals also work while in hotels, at events, and at customer premises. At hotels and events, WiFi hotspots, or even Ethernet, might be present. However, the use of WiFi at hotspots can compromise enterprise security. At customer premises, WiFi and Ethernet will be present, but very often the use of these networks by non-employees is considered a security risk. UMTS and HSDPA, on the other hand, are available in nearly all locations and customer premises.

This shows that the most widely available connectivity options today for the mobile professional are not integrated in the notebook, whereas Ethernet and WiFi are. In order to enable their mobile workers to stay connected whenever and wherever they are, organizations have equipped their mobile professionals with detached cellular connectivity options such as UMTS PC Cards and USB sticks. IDC believes that a shift from detachable to embedded solutions will be the standard progression for the network connectivity of computing devices, and offers key benefits to users.

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The WiFi Case

The movement from detachable to integrated solutions is a fairly common progression in technology implementation. The case of WiFi is a great precedent. When launched in 1994, WiFi adoption was extremely limited, inhibited by the high cost of WiFi cards, estimated at about six times their current cost. The expansion of WiFi into the mainstream started in 2002 with the introduction of a series of products featuring 802.11g, which was approved a year later by IEEE. Since then, WiFi technology has expanded, largely thanks to the availability of embedded WiFi solutions in notebooks, combined with the proliferation of access points in homes, hotels, cafes, and other public places such as airport and train terminals.

IDC believes that embedded WiFi solutions contributed greatly to the growth of the notebook market. The WiFi interface is based on industry standards and unlicensed spectrum, making it an inexpensive and popular technology. Product manufacturers have taken advantage of this wireless interface and embedded it in many mobile products. Notebooks have benefited from WiFi technology and provided an ideal platform for demonstrating its uses. IDC believes that the shift from detachable to embedded connectivity seen in the case of WiFi is likely to be emulated in the case of embedded cellular over time.

Embedded Versus Detachable Cellular Notebook Solutions

As with WiFi, IDC expects mobile broadband to go mainstream in the long term, facilitated by integrated solutions instead of through the use of a PC Card or USB. There is a strong case to make in favor of embedded solutions in terms of performance, durability, enterprise IT management, usability, and total cost of ownership (TCO). Figure 3 highlights the main benefits, which are discussed in greater detail in the following section.

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FIGURE 3

Embedded Cellular Benefits

Performance	Longer battery life Preconfigured, preinstalled software Improved antenna performance
Durability	No loose or protruding parts Pretested configuration No insertion/removal of parts
Enterprise IT management	Dependency on fewer vendors Easier to deploy and roll out Simultaneous refresh of notebook and connectivity
Usability	No lost, forgotten, misplaced, or broken parts No risk of wrong insertion/removal of parts Always on, no need for insertion of parts
Cost	Similar acquisition cost to detached solution Operator connectivity device subsidy remains Lowered TCO cost due to ease of use and manageability

Source: IDC, 2008

Performance

Leading OEMs responsible for the design and manufacturing of notebook PCs use a holistic and comprehensive approach to parts assembly in an effort to maximize performance and boost efficiencies. Such efficiencies in integrating hardware and software lead, for example, to improved battery life, better use of the antenna, and better overall performance, as connectivity software is preconfigured and preinstalled. This tight integration is not present with detachable solutions, as the USB or PC Card will have to work with a range of notebook brands and models.

Durability

With embedded solutions there are no independent loose or protruding parts or movable antennas to deal with. The configuration has been pretested for durability and the insertion or removal of parts is not necessary. With detachable solutions, protruding parts or antennas can break, leading to user and IT support frustration. Many detachable cards are not even tested with specific notebooks before they are sold.

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Enterprise IT Management

IDC believes that the IT department can gain efficiencies from using embedded solutions. Procurement in the case of embedded solutions is simplified because there is no additional process in the acquisition of hardware. Procurement management would follow a simplified model because the wireless module is part of notebook procurement and does not require its own purchasing process. This also means the IT department depends on fewer vendors. Support is also simplified as the notebook vendor would support the built-in connectivity as well.

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One of the most important costs of IT is hardware and software deployment. By having a cellular module integrated into the PC notebook, companies will save money, time, and resources, since adoption and rollout will not require two sets of schedules. Equally important to cost containment is that connectivity refresh cycles will now follow notebook and IT refresh schedules adopted by the enterprise, when embedded solutions are considered.

In the case of detachable solutions, very often the vendor of the notebook and the connectivity hardware will be different, rollout will need to involve the user through insertion of the device, and IT will need to support different models and types of PC Card and USB solutions as parts break or get lost .

Usability

Embedded solutions remove the hassle of making connections when LAN, WiFi, and UMTS options are available. Embedded solutions simplify access management and reduce user confusion. The connection will simply be always on and there will be no lost, forgotten, misplaced, or broken parts. There is also no risk of wrong insertion/removal of parts.

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With detachable solutions, there is a real risk that expected productivity gains will not be achieved because user adoption will be limited. Simply putting the USB stick into the wrong USB slot can already create user confusion. Lost, broken, stolen, and misplaced cards will be a source of frustration for both the employee and enterprise IT management.

Cost

Summarizing the above, IDC believes that the cost of ownership for embedded cellular notebook solutions will be lower than that for comparable detached solutions. The acquisition cost of both types of solution is comparable. We believe the benefit of operator connectivity device subsidy remains with both options, but it is the ease of use and manageability benefits discussed earlier that are the real clincher.

IDC spoke to two enterprise IT organizations to validate the embedded cellular benefits discussed previously. In the following section, you will find out why they chose to implement embedded solutions.

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Case Study: Inter Access

With more than 1,100 staff in the Netherlands and Belgium, Inter Access is an ICT service provider for the development and control of information services for medium-sized and larger organizations in the public sector, healthcare, trade, industry, and financial services. Inter Access offers integral ICT solutions based on standard or customized components or by deploying skilled and experienced people. Inter Access chooses to apply standards-based technology from leading suppliers such as IBM, Microsoft, Oracle, and SAP.

Inter Access equipped all 900 employees in the Netherlands with an embedded cellular notebook and a smart phone during December 2007 and January 2008. Before December 2007, only 200 employees had a smart phone, and only 50 had a laptop with a detached data card.

IDC talked to Peter Krauth, information manager. Krauth is responsible for the internal ICT management at Inter Access in the Netherlands.

"One of the key ICT solution themes that Inter Access has developed is the High-Performance Workplace, which is all about a new way of working: access, applications, collaboration, and so on. Our philosophy is that what we implement for our customers, we also implement ourselves. Every employee at Inter Access is equipped with a notebook with embedded cellular and a smartphone," Krauth said.

The implementation of the always-online principle actually leads to the adoption of new applications and increased efficiency. Krauth said: "Now that everybody is always online, we are looking at implementing functionality such as presence and unified communications. We expect usage to grow and consequently efficiency to improve."

Inter Access looked at USB, PC Card, and embedded solutions. It chose the embedded form factor. "From a solution management perspective, we wanted a solution that was reliable and stable. The embedded WAN connectivity is always there so the employee does not have to do anything. We used to have PC Card cellular connectivity. From the IT department standpoint this became unmanageable," said Krauth.

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For Inter Access, the migration was smooth and painless, he added: "We switched to the new notebooks in the week before Christmas. This gave everybody the opportunity to get acquainted with the new devices over the holiday period. We did not increase helpdesk presence during the rollout, but Inter Access is an IT company and as such not comparable to the average company with regards to IT knowledge and use."

Already the effects of anywhere, anytime, anyplace connectivity can be seen: "We have seen a change in behavior with our employees," said Krauth. "With the new tools there are significantly more teleconferences and videoconferencing and the sharing of documents has started to take off. We also see an increase in cellular WAN traffic, but we had planned for that. It was easy for us to predict contact, email, and calendar usage. But you cannot plan for behavioral changes. We have a flexible cellular data contract that anticipates increased data use.

"If I buy a notebook today, I expect cellular to be integrated, similar to WiFi. My advice for ICT managers that are looking to deploy cellular notebooks for employees to stay connected to enterprise applications is to go for the embedded solution. It will save the ICT department time, cost, and management headache, and will enable the user more than ever before."

Case Study: Twynstra Gudde

Twynstra Gudde Consultants and Managers is a leading consultancy firm that has provided result-oriented consultancy services and has filled management positions in different market segments for more than 40 years. The core competencies of Twynstra Gudde are project and program management, change management, and organizational design.

Twynstra Gudde has approximately 450 employees in two locations in the Netherlands. All consultants and managers, about 350 employees, are always online with their notebook with embedded UMTS/HSDPA. Other employees have Web access capability but are not always online (yet).

IDC talked to Ruud Zoutenbier. Zoutenbier is coordinator of ICT and is responsible for all aspects of ICT in Twynstra Gudde, including ICT infrastructure, telephony, and ICT sourcing.

"The enterprise Web portal concept and employee portal access anywhere, anytime, anyplace are central to the Twynstra Gudde ICT philosophy," Zoutenbier said. "We have chosen to implement the always-online principle with our consultants and managers. We believe we can increase efficiency in this highly mobile group, and enable our consultants to be more productive and get the job done more quickly and effectively, resulting in employee and customer satisfaction."

When Twynstra Gudde decided it was time to refresh the notebook installed base, a key notebook brand decision criteria was the availability of embedded cellular. "We used to work with PC Cards, but these were misplaced, lost, or forgotten, or the cards simply broke," said Zoutenbier. "It was a mess. We learned from this and decided we did not want to have anything protruding from the notebook. The notebook/operator configuration we use has been tested with regards to performance, connectivity,

coverage, network availability, and durability among others. Network availability is a key aspect of this, but we chose embedded over detached primarily because of durability and ease of use."

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Twynstra Gudde outsourced the notebook rollout to a third party. "We had a helpdesk installed," said Zoutenbier. "There was always someone available to field any questions. We provided documentation to all embedded notebook users. We have had very few questions from employees."

Zoutenbier does have some advice for ICT managers that are embarking on the always-online principle and are rolling out embedded cellular notebooks: "Make sure that you communicate the do's and don'ts to employees. Monitor the usage, both from an application and roaming perspective. Find the balance between user freedom and corporate policy. Educate the users.

"Our employees cannot imagine business life anymore without being always online. Once people have experienced this sense of freedom, you cannot take it away from them, and it will be extremely difficult for them to do without."

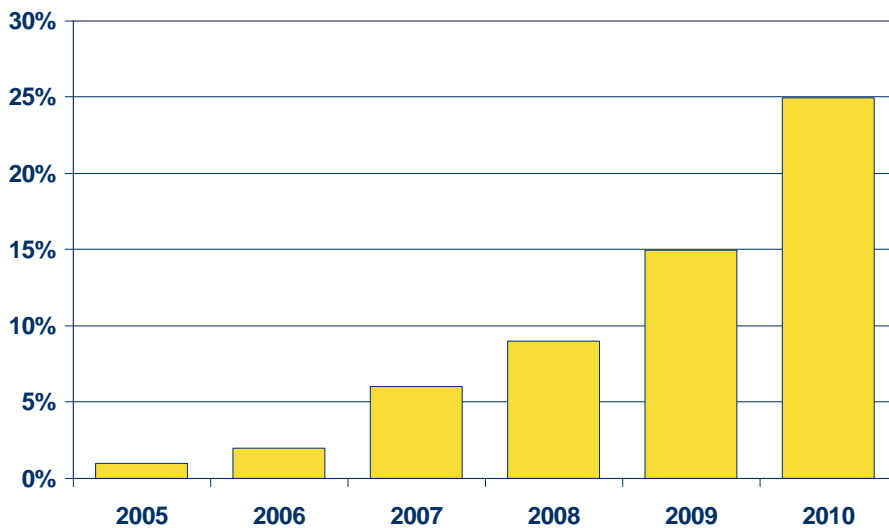
Embedded Adoption Forecast

As these case studies show, some ICT buyers are starting to take embedded cellular as a key decision criteria for notebook brand purchase. As a result, PC notebook vendors such as Lenovo, Dell, HP, and Fujitsu Siemens, view an embedded cellular network connectivity solution as a key differentiator in the business segment. Desktop and laptop PC vendors have become very aggressive in making embedded cellular or mobile broadband connectivity available. We expect a rise in shipments of notebooks with embedded cellular radios to 9% of all notebooks in 2008 (see Figure 4).

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FIGURE 4

Worldwide Embedded Cellular Penetration in Notebooks, 2005–2010 (%)



Source: IDC, 2008

In the medium term, we expect a wider availability of notebooks — principally, high-end notebooks — with embedded cellular radios. Concurrently, we expect cellular service costs to decline. By 2009, we expect about 15% of PC notebooks to be available with embedded cellular connectivity.

We believe a growing installed base of devices and growing usage are likely to encourage mobile operators to lower the subscription cost of the monthly service and become more flexible in pricing their offering.

In the long term, towards the end of the forecast period and beyond, we expect the momentum for embedded cellular broadband connectivity to gather steam, and we also expect nearly 25% of all notebooks shipped by 2010 to come equipped with mobile broadband connectivity.

Challenges

Enterprises planning on providing embedded cellular notebook connectivity to their employees should be aware of the following when planning their connected notebook rollout:

- ☒ Providing ubiquitous connectivity will increase productivity but will also increase telecommunications use and costs. Plan for flexible service plans that offer price benefits when use increases.
- ☒ Be aware of and understand and possibly plan for the propensity of users to change communications behavior once they are always online. Some behavior might be predictable, but as the Inter Access case study shows, some behavior might be unexpected.
- ☒ Educate employees on the dos and don'ts of mobile communications. Let them know what is acceptable and what is not. Monitor the usage, both from an application and roaming perspective. Find the balance between user freedom and corporate policy.
- ☒ Implement a strict security policy around mobility that is part of the overall company security policy. Mobile employees are more vulnerable to security breaches and attacks than employees that are in the office. Mobile employees that are always online are more vulnerable than employees that are sometimes online.

Bottom Line

IDC believes that the shift from detachable to embedded solutions is a standard progression for the network connectivity of computing devices, and offers key benefits to users.

Organizations with many professionals on the road that need to stay connected to critical enterprise resources and applications should investigate the feasibility of implementing embedded cellular notebook connectivity. IDC believes that embedded cellular has significant advantages over a detached solution from a performance, durability, enterprise IT management, usability, and cost perspective. Most important, however, employees will experience the availability of all the functions of their desktop office wherever they are. Enterprise IT management will experience the ease

Finance will experience lower TCOs due to improved ease of use and manageability.

of rolling out, deploying, and managing embedded notebook connectivity. Finance will experience lower TCOs due to improved ease of use and manageability.

Methodology

Market data and forecasts are based on published IDC documents. The case studies are based on IDC analyst interviews with Twynstra Gudde and Inter Access — both customers of Vodafone Netherlands. The interviews were conducted during April 2008. Interviews were based on qualitative discussions. All interview partners were given the opportunity to review their answers.

An "embedded solution," in the context of this white paper, is defined as a set of hardware and software solutions integrated into a notebook for voice and high-speed data access via a third-generation wireless WAN. It involves a PC OEM that helps design the modules and incorporates them into the notebook during system assembly, a wireless modem maker that manufactures the modem and supplies the drivers to function properly with the PC, and a telecom operator that offers the cellular service.

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