

# Pocketing the Internet

*Anywhere, anytime and always on*





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## Introduction

The internet, that global network of computers that has changed so many facets of contemporary life, can trace its origins to a research project initiated by the US Department of Defense just 50 years ago.

The World Wide Web, conceived at the European Organisation for Nuclear Research (CERN) to facilitate information sharing between scientists all over the world, only came into being as recently as 1989. Through its linked documents and intuitive ease-of-use, the World Wide Web has been the catalyst for extending the use of the internet beyond elite scientific and academic communities into commerce, industry and, more recently, the general population.

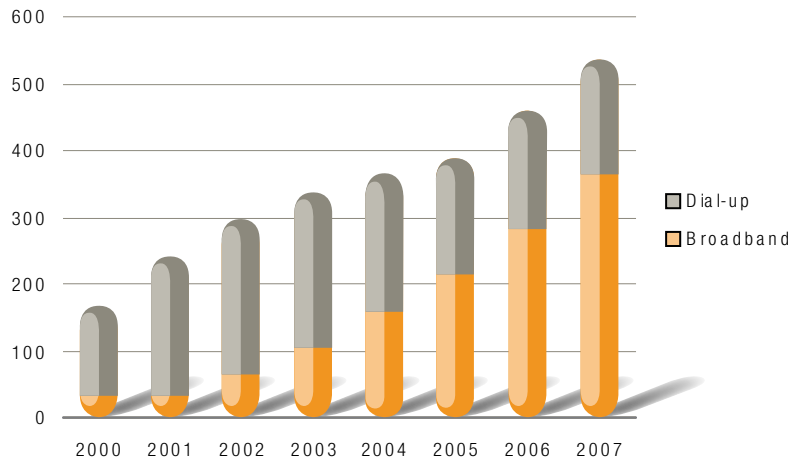
The spectacular spread of the internet and its World Wide Web have been surpassed only by the phenomenal growth in mobile phone use. Since the launch of the first “cellular” networks in the early 1990s, the mobile has been adopted by more than 3.5 billion people worldwide – and has become part of everyday life for more than half of humanity.

Having discovered the combined power of the internet and the world wide web, and embraced the freedom and flexibility of the mobile phone, ordinary people are increasingly seeing access to the internet while mobile as the next logical and inevitable step.

The transition from dial-up to the use of the mobile phone made people get used to being connected all of the time. With the every increasing bandwidth - a bigger pipe where data runs faster through - people got used to doing more like e-mail, going onto the internet, playing games. **Now they want best of all worlds: being mobile, being connected always and everywhere. The killer application for this all is ‘bandwidth’ or ‘broadband’. A “broadband lifestyle” is settling in.**

## Getting connected

**Chart 1: Global internet connections**

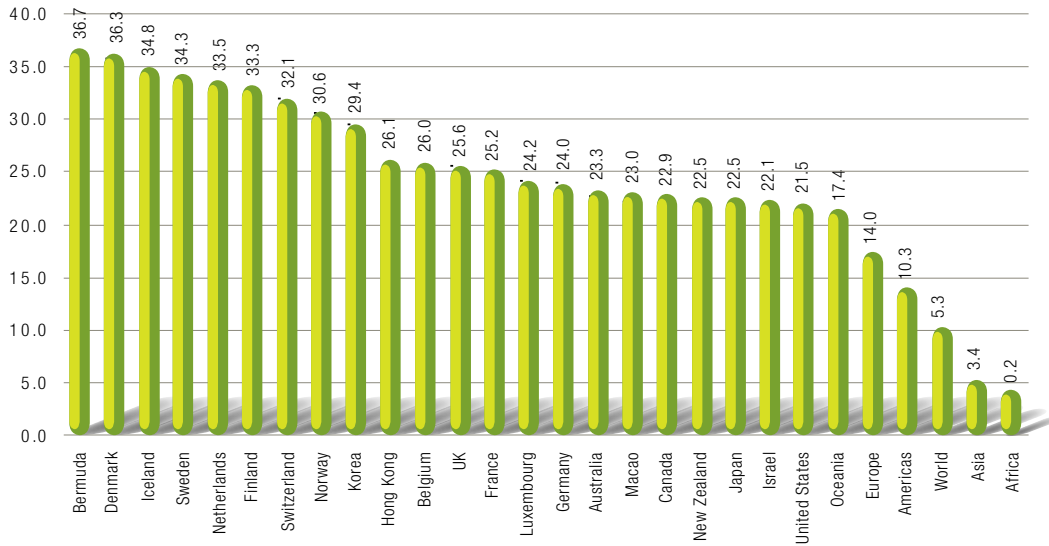


Source: International Telecommunications Union

By the end of 2007, there were in excess of 535 million internet connections worldwide<sup>1</sup>. Of these, broadband connections - capable of delivering more than the absolute minimum of 256 kbs - accounted for more than 360 million or 67 percent of connections. Globally, there were 5.28 broadband connections per 100 people.

In the more developed economies broadband penetration is significantly higher than the world and regional averages. There were more than 30 broadband connections per hundred inhabitants in Bermuda, Denmark, Iceland, Sweden, the Netherlands, Finland, Switzerland and Norway by the end of 2007 (Chart 1). Continental Europe contributes 11 of the world's 20 most highly penetrated broadband markets.

**Chart 2: Broadband connections per 100 inhabitants (end 07)**

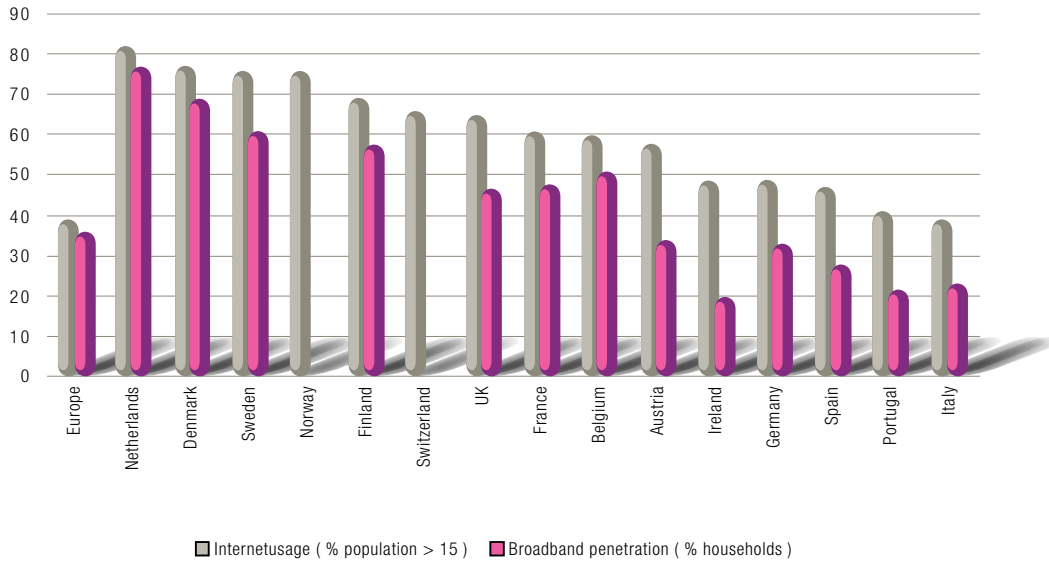


Source: International Telecommunications Union

Korea and Japan represent the Asian nations in the global top 20 along with the territories of Hong Kong and Macau. While the Americas can claim the world's most penetrated market in the prosperous island of Bermuda, the continent's next most connected nation is Canada (ranked 18) with the United States lying just outside the top 20. Oceania has the highest average penetration among the continents thanks largely to high penetrations in Australia and New Zealand, the region's most populous nations.

Within the EU, broadband penetration of households is highest in the Netherlands (77 percent) and Denmark (69 percent) with Sweden and Finland following in the adoption league table<sup>ii</sup>. Penetration of internet usage within national populations appears closely linked to the proportion of households with broadband connections (Chart 3).

**Chart 3: Internetusage vs broadband penetration in Europe**

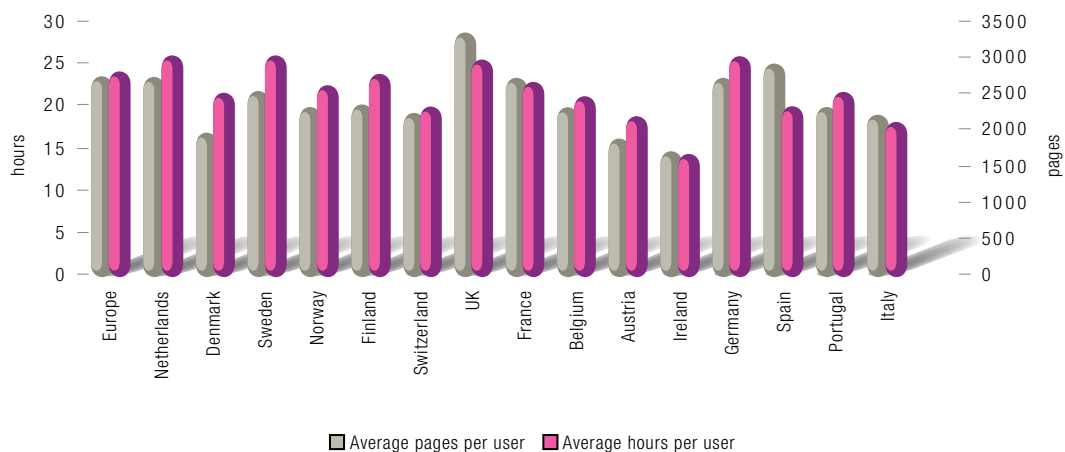


Sources: Internet usage: comScore World Metrix; Broadband penetration: EU Special EUROBAROMETER 293 – "E-Communications Household Survey" (excludes Norway and Switzerland)

The internet is now clearly an integral part of day-to-day life among Europeans. In the Netherlands, 82 percent of the Dutch population aged over 15 went online in June 2008 (Chart 3)<sup>iii</sup>. Adoption rates were around 70 percent or higher across the Nordic countries.

In June 2008, the average European spent the equivalent of three typical working days - 23.3 hours - online and accessed 2665 web pages (Chart 4).

**Chart 4: 3G Monthly internet usage in Europe**



Source: E-Communications Household Survey, Special Eurobarometer 293, EU

## Always on: changes behavior

The World Internet Project, a long-term study on the impact over time of the Internet on families and society is regularly surveying the experiences and behaviour of representative panels in 30 countries worldwide. The diverse participants include the US, Singapore, Italy, Sweden, Britain, Germany, France, Hungary, China, Hong Kong, Taiwan, Japan, Korea, India, Iran, Chile, Argentina, Bolivia. The US contribution, the Digital Future Project™, reported the findings of its seventh annual survey in 2008.

These surveys have revealed that it is the “always on” nature of broadband rather than its speed has had the most significant impact on peoples’ attitude to and use of the internet.

Because of the dial-up process, which users perceive to be lengthy and irritating, the typical dial-up user goes online 2-3 times a day and stays on-line for 20-30 minutes at a time. Tasks tend to be aggregated to make best use of each session and the computer is usually located in a study or spare bedroom where the user is most likely to remain undisturbed. A user who forgets to complete a task during a session gets very irritated at the thought of having

to reconnect. In the dial-up household, the internet user is usually isolated from the rest of the family.

With an always-on broadband connection, the number of sessions a day rises dramatically, but their duration falls. The average user may be online 30-50 times a day but many sessions will only last 2-3 minutes. If the user forgets a task, they are content to come back later. As a result, internet use fits more comfortably into the normal rhythm of family life, and the computer is now commonly found in communal rooms such as the lounge or increasingly the kitchen, the focal point of most households. More than two thirds of broadband users in the US now leave their connection on most of the time they are at home.

According to the most recent results from the Digital Future Project, e-mail remains the most popular online activity with 99 percent of American internet users actively e-mailing, and 96 percent using the facility at least weekly. Expectations for e-mail are changing too: 31 percent of e-mail users now expect that personal e-mail messages should be answered as soon as possible – up from 24 percent in 2006.

**Table 1: Percent of US internet users undertaking activity at least weekly**

Access e-mail	96%
Surfing internet without specific destination	71%
Seeking news	60%
Product information searches	43%
Online banking / financial services	38%
Instant messaging	37%
Playing online games	35%
Searching for humorous content	25%

*Source: 2008 Annual Internet Survey, Center for the Digital Future*



Digital Future also found that the number of online purchasers grew 16 percent in a year. Of US internet users over the age of 18, 60 percent bought online and typically made more than 36 online purchases during 2007. But the internet is not necessarily displacing traditional shopping: users are increasingly sophisticated in combining their online and store-based purchasing. Nearly three quarters of US Internet purchasers said they browse in traditional retail locations and then buy online while even higher percentages use the Internet as a merchandise browsing tool before buying in stores.

The internet has also become very important as a source of information. Eighty percent of US internet users aged 17 or more consider the internet to be an important source of information. Perceptions of the reliability and accuracy of online information is also rising, especially for frequently visited and media web pages. This rating has risen from 66 percent in 2006. By comparison, 68 percent of Americans rate television as an important source, 63 percent radio and 63 percent newspapers.

Central to the internet's role as the pre-eminent information source is the increasing sophistication of search engines. Google, Microsoft and Yahoo! sites filled the top three places in the league table of global web properties in May 2008 with Google attracting 643.8 million unique visitors in the month<sup>v</sup>. Google is the most commonly visited website in all countries except Japan according to research covering the UK, France, Germany, Italy, USA, Canada and Japan<sup>vi</sup>. The same study found that Web 2.0 sites increasingly feature in the top ten sites internationally: YouTube and Wikipedia appeared in the top ten in four and five of the countries respectively.

Corroborating the Digital Future Project's finding<sup>vii</sup> that e-mail is the most popular internet application, Ofcom's international comparison<sup>viii</sup> also revealed that the share of internet users using e-mail is broadly consistent across the seven markets surveyed. By contrast, the use of instant messaging and social networking websites is much more varied: IM was most popular in France while the Canadians came out as the top social networkers. But social networking continues to

grow: in the US, membership of online communities has more than doubled in three years and more than half of community members log into their community at least once a day<sup>ix</sup>.

While the transition from dial-up to broadband has changed the way in which users access the web, the steady increase in bandwidth available over broadband has greatly improved the experience, allowing users to do more in the same amount of time. Broadband has also made more bandwidth-intensive activities such as multimedia downloads and streaming or sharing larger files such as images a practical reality. Between 33 percent and 56 percent of internet users across the international markets surveyed by Ofcom watched or downloaded video clips online in 2007.

Technologies such as Wi-Fi have greatly simplified the sharing of connections and have certainly contributed to the higher penetration of internet usage in markets with higher broadband penetration. Roughly half (46 percent) of households with internet access in the European Union had a Wi-Fi modem/router at the end of 2007<sup>x</sup>.



*Acer Aspire One, a Netbook with a broadband wireless module from Option® inside*

## Towards Mobile Broadband

In making the broadband connection more easily accessible within the home, the incidence of accessing the internet while engaged in other activities or consuming other media, particularly television, is increasing. Wi-Fi has given millions of people a taste of the versatility and convenience of wireless internet access. **Through cellular-based mobile broadband, internet access can be achieved over much wider areas.** Initially, speeds delivered across GPRS or EDGE were only comparable with dial-up. Even so, for mobile professionals seeking wireless connectivity, this was a major advance. Data cards - the majority supplied by Option® - were the launch vehicle for 3G across much of Europe in 2003-4 when they were positioned as a premium enterprise connectivity solution.

With the subsequent evolution of 3G technology, speeds have begun to approach those of DSL, significantly increasing market acceptance and adoption. Plug-and-play 3G USB wireless modems introduced during 2007 have enjoyed major success with consumers and the self-employed extending mobile broadband into new market segments.



*A broadband USB Modem from Vodafone, designed and manufactured by Option®*

Growth drivers have included the much improved broadband internet experience combined with the flexibility, versatility and convenience of a wireless solution and affordable data plans, including the recent emergence of pre-pay propositions. Another increasingly important factor has been a focus on product design that appeals to style-conscious consumers who prioritize look and feel alongside ease-of-use.

Their ease-of-use (and the reduced need for IT support) mean that USB modems are even growing in popularity in larger corporations. Interestingly, the USB wireless modem represents a reversal of the typical IT product life cycle where innovations are usually

launched into the enterprise market and are only later offered to consumer segments.

**Consumer demand for wireless modems is forecast<sup>xi</sup> to experience compound annual growth of 57 percent** from 2007 to reach 97.8 million units a year in 2013. Business demand is expected to be more modest, growing at 38 percent per annum from a higher base to reach 100.7 million units in 2013.

The speed of take-up in the mobile broadband market has been dramatic. In Britain, for example, there were more than 500,000 new mobile broadband connections in the five months from February 2008<sup>xii</sup>: new connections reached 133,000 in June 2008. Mobile is now seen as an alternative to fixed broadband: 75 percent of the UK's mobile broadband subscribers used the service at home, 18 percent at work and 27 percent on the move. In the first quarter of 2008, 6 percent of UK adults used mobile broadband. The mobile penetration percentage is in Spain about 20% (1/5 of the population).

As a supplier of wireless connectivity solutions, Option® has seen its own product mix reflect the significant changes in the market. USB modems barely existed in Option's portfolio in 2006. They accounted for 31 percent of shipments in Q4 2007 and 77 percent in Q2 2008.

Similar rapid growth has been witnessed in the US. As of the second quarter of 2008, 13 million wireless data devices were in use in the US. More than half of these had been purchased within the previous 12 months. Of a sample of 1300 American mobile data users, 43 percent said they mostly used their devices at home, 15 percent at work, 21 percent while outdoors and 9 percent while commuting<sup>xiii</sup>.

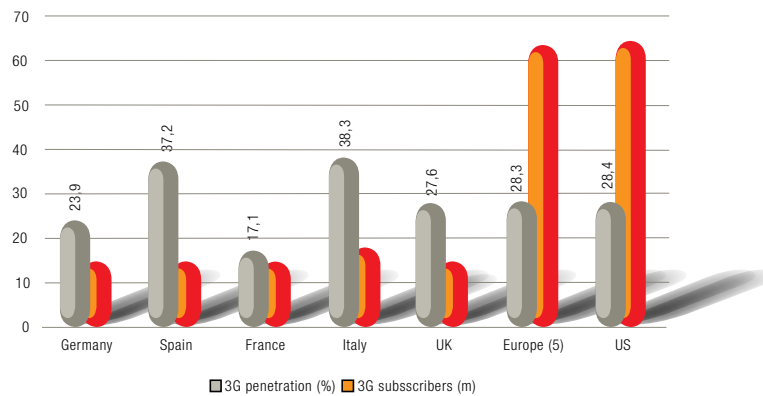
Most of the current data card market is likely to migrate to PCs with mobile broadband embedded as the manufacturers work with experienced embedded module suppliers to incorporate these highly sophisticated communications devices within their laptops. Battery constraints will mean laptop-centric mobile broadband users are unlikely to enjoy the always-on connectivity of the home or office internet users but their need to access the wide range of familiar business PC applications, and their regular international travel, will ensure these users remain an important and valuable market segment.

## Internet in Your Pocket

Four years after the data card signaled the arrival of 3G, there is now a much wider choice of 3G smartphones and feature-phones. Handset manufacturers are placing greater emphasis on browsing performance and user experience, especially in the wake of the launch of Apple's iPhone.

The penetration of 3G web-enabled handsets is starting to show real scale, exceeding a quarter of all mobile users across Europe's five largest markets and in the United States (Chart 5)<sup>xv</sup>. The number of U.S. subscribers with 3G enabled devices grown 80 percent to 64.2 million during the year to June 2008.

**Chart 5: 3G adoption (end June 08)**



Source: comScore, September 2008

**Mobile broadband has the potential to make the internet even more accessible, personal, interactive and portable.** Equally, it can add exciting new dimensions to a wide variety of consumer electronic devices. Even before the launch of the 3G iPhone, the iPod Touch, with its Wi-Fi connection, gave a glimpse of the potential of portable wireless broadband-enabled multimedia player. Games consoles and cameras could also be transformed with mobile broadband connectivity.

Research in Motion has already successfully transferred the internet's most widely used application – e-mail – to the mobile environment with its pioneering always-on portable device. Many other handset manufacturers now include e-mail capability in their smart- and feature-phone ranges. Mobile solutions are ideally placed to meet the rising expectations of faster response to e-mail.

The increasing penetration of 3G is beginning to translate into broader use of the internet: by Q2 2008, 15.6 percent of US mobile subscribers, 12.9 percent of UK and 11.9 percent of Italian subscribers were actively

accessing the internet while mobile<sup>xv</sup>. While voice was the killer application for first and second generation mobile, the killer application for the mobile internet is the infinite variety of the world wide web.

As with fixed broadband users, search is increasingly important to mobile internet users. In the year to June 2008, the number of U.S. mobile subscribers accessing search during the month rose by 68 percent to 20.8 million. In the five largest western European markets, adoption of internet search grew 38 percent to 4.5 million users over the same period<sup>xvi</sup>. At 9.5 percent, the UK had the highest penetration of mobile subscribers using search, followed closely by the U.S. at 9.2 percent.

As the number of mobile search users increases, the frequency of activity is also growing.

Google is demonstrating similar dominance in mobile as in the fixed world with a 60 percent share of mobile searchers in all countries. Yahoo! ranks second in Germany, Italy, the UK and the US but at 34.6 percent, its US mobile searcher penetration is more than double its share in most other countries.

## Unique Selling Points

Mobile can add real value to the internet experience. Mobile's ability to deliver location-specific information and the device's inherent ability to authenticate the identity of its owner are potentially potent attributes. The use of mobile maps is increasingly popular in the United States and Europe, with 8 percent of American mobile subscribers and 3 percent of European users accessing maps from the mobile phone in the three-month period ending May 2008<sup>xvii</sup>. Combined with network-based location information or GPS, mapping and navigation is highly relevant to the mobile internet user. Effectively combining search with mapping and navigation opens up a wealth of new opportunities in mobile marketing and e-commerce.

Internet users are increasingly familiar with the challenge of remembering and managing their ever growing collection of website logins and passwords. The mobile smart card's trusted role in authentication provides a platform for the development of versatile and secure personal identity management systems. The SMS communications channel can also be exploited as an additional tool in this field. Social networking and community membership are increasingly important to a growing number of internet users. Mobile greatly extends the opportunities for users to interact and share content with these groups. More than 5 percent of Americans and nearly 3 percent of European mobile users over the age of 13 have already accessed social networking sites from their mobiles<sup>xviii</sup>.

It is a natural progression for owners of camera phones to share pictures, audio and even video: after a slow start, photo messaging is growing, up 60 percent in the United States in the year to July 2008 and up 16 percent in Europe<sup>xix</sup>.

Some observers see the mobile's phone book as a social network in its own right and it is only a matter of time before a social networking site, application developer or device manufacturer finds a way to seamlessly integrate phone book and friends' list. This synergy has prompted a range of forecasts for mobile social networking: ABI Research predicts 140 million people<sup>xx</sup> will be using mobile social networks by 2013. In-Stat predicts as many as 229 million people could be using mobile social networks in 2012<sup>xxi</sup>.

The opportunities for the mobile internet are immense. The evolution of consumer behavior and adoption will be driven largely by new software applications that attract and entice consumers, extending and improving their mobile experience.

## Mobile Internet Devices

With a screen size of between four and six inches, Mobile Internet Devices – or MIDs - are portable and pocketable web-centric devices that allow users to communicate with others, be entertained, take part in online gaming and access information – all while on-the-go. In terms of current product sectors, they sit somewhere between smartphones and ultra mobile personal computers.

Like PCs, MIDs will be highly personalisable and provide their owners with the ability to interact through voice, text, e-mail or IM with their own communities, update their own blogs and social network profile pages and access their favorite audio and video.



*A Compal MID incorporating a broadband wireless module from Option®*

Application software will be critical to delivering a true always-on broadband experience. In a mobile device, each clock cycle of the CPU consumes power and reduces battery life. As a result, for optimum performance MID software, whether operating systems, connectivity management software or applications, needs to be written specifically for the mobile environment. More densely programmed software will increase user engagement and loyalty by consuming fewer the clock cycles to fulfill the chosen function and so extending battery life. Drawing on the experience it has gained working with laptop and MID manufacturers, Option® sees software as critical to the success of all mobile broadband-enabled devices and is investing heavily in the field.

Within the constraints imposed by the need to provide a screen large enough for comfortable viewing, MID designers will compete fiercely to reduce the overall size and weight of their products. The battle to make slimmer devices will drive demand for ever more compact components and sub-systems, a trend that Option® has already anticipated with its development of the world's smallest embedded HSPA module.

## Conclusion

Broadband has made the internet an indispensable part of the modern consumer lifestyle. Increased bandwidth has enhanced the utility of the internet, but it's the always-on nature of a broadband connection that makes the internet so compelling and engaging. Mobile broadband gives consumers the chance to pocket their internet access and take it with them, just as billions have already done with their voice telephony.

However, the fixed internet world suggests that to achieve its full potential, the mobile internet experience needs to support e-mail, offer full search capabilities (but with smarter result reporting), enable social network interaction and deliver multimedia content such as video effectively.

While mobility implies wide area coverage, the evidence suggests that users are likely to place equal importance on their ability to remain connected while moving freely around their own home. To satisfy this expectation, operators, device manufacturers and 3G technology providers need to work together to combine their design and engineering skills.

And, as consumers flock to the mobile internet in ever larger numbers, the demand for software

applications to enhance and extend the mobile experience will grow as well. The emergence of secure solutions, content-based offerings, GPS applications and mobile commerce products will fuel rampant consumer demand for mobile data.

Option® first outlined its vision of anytime, anywhere, easy access to information in 1986 – even before the invention of the world wide web - when it developed its first computer connectivity device targeted at travelling executives. Two decades later, mobiles and broadband internet access have become parts of everyday life and Option® is at the heart of efforts to converge the two through its consumer-friendly products such as USB modems and high performance embedded modules.

Today, Option® is convinced that success for consumer, operator and device manufacturer will be determined by a new approach to software development. The company is now investing heavily to make its contribution to the delivery of innovative and compelling applications that are lean and efficient and capable of delivering the “always-on” broadband experience in a mobile environment.

## About Option®

Option®, the wireless technology company, designs, develops, and manufactures devices that provide high-quality wireless access to the Internet via 3G HSPA technologies.

The company has established an impressive reputation for creating exciting products that enhance the performance and functionality of wireless communications. Since our inception we have realized no less than 15 world-firsts in the wireless industry.

The world's leading mobile telecom operators guarantee their mass market and professional customers easy and reliable wireless Internet access through our data cards and USB devices.

Today, our products are used around the world. The world's top manufacturers of notebooks and consumer electronics incorporate our wireless Internet access modules into their new lines of laptops and mobile internet devices. Option's GTM 501 is currently the world's smallest wireless module and the only 3G module available today in the same LGA form factor that has been proposed for WiMAX.

We also offer our customers the appropriate, user-friendly Internet connection software written specifically for the mobile environment.

Option® is headquartered in Leuven, Belgium. The company conducts its Research & Development in Leuven and Düsseldorf, Germany. The Düsseldorf facility is currently developing comprehensive test facilities that are intended to secure accreditation as "Trusted Labs" from the major mobile operator groups. This will enable Option® to accelerate the certification process of its own modules and third party MID's incorporating Option® modules.

Software development is undertaken by a specialist team in Augsburg, Germany while our ISO 9001 production engineering and logistics facility is located in Cork, Ireland. Option® also maintains offices in Europe, US, Asia, Japan and Australia.

For more information please visit [www.option.com](http://www.option.com).

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