BEYOND THE MOBILE FRONTIER

THE WIDER ADOPTION OF HIGH-SPEED MOBILE INTERNET IS BEING SPURRED BY NEW BROADBAND TECHNOLOGIES HOPING TO DELIVER WHAT 3G PROMISED.

A whole new set of technologies will fuel the development of existing mobile Internet networks. It is hoped that these will lead to increased speeds, improved functionality and guaranteed connectivity for some of the world's more remote regions.

The Internet crossed a watershed in 2005. The underlying technology of the web finally caught up with the over-hyped, dot-com expectations, as access to high-speed connections became the norm. Figures from the International Telecommunications Union show the level of Internet users with home broadband running at over 90% in countries such as South Korea and Israel, and other estimates put penetration in the US at over 70%.

But there is a large piece of that picture missing: the mobile Internet. While fixed-line connections have become fast and affordable, web access from mobile phones, PDAs and other mobile devices is still far from common.

Now, however, a set of technologies (*see box, New broadband technologies*) are being developed to speed up existing mobile Internet networks, provide enhanced geographical connectivity and add capabilities suited to those devices.

CALL WAITING

Although its mass adoption makes the mobile phone the most obvious channel for the mobile Internet, the first high-speed incarnation of such a service, 3G, promised much but delivered little. There are a number of reasons for this: providers are yet to find successful ways of marketing the proposition; it costs too much and the content is not compelling to consumers.

The fact that there are two incompatible and competing 3G technologies does not help either: Wideband Code-Division Multiple Access (W-CDMA), the standard for Europe and Japan is up against Code-Division Multiple Access2000 (CDMA2000), mainly adopted in the US and Asia.

Adoption rates vary. Only 35 million of the world's two billion mobile phone users subscribe to the former, although analyst firm Forrester Research predicts that by the end of 2007, 33% of mobile users in Western Europe will be using it.

Advocates for CDMA2000 claim it has at least 200 million global subscribers. However, critics argue that this figure is misleading; countering that only those networks that have been upgraded to the 1xEV-DO (Evolution, Data Optimised) standard get the promised 3G experience. This, they say, puts the true number of subscribers closer to 18 million. Even combined, this is nothing like the number of 3G subscribers originally expected by network providers.

Few research findings, however, mention just how many subscribers actually use 3G services, and those that do paint an even darker picture. A survey of UK 3G subscribers by online market research company Harris Interactive found that 41% stuck to text and voice capabilities, forgoing anything else.

"There's a danger in 3G being given away without effectively marketing the services to consumers," says Derek Eccleston, technology research director at Harris Interactive. "Service providers are seeding the market with the product and then relying on above and below the line marketing to generate momentum for key services."

3G AND BEYOND

The public is clearly unimpressed with 3G so far and providers are hoping that forthcoming upgrades will help improve adoption rates, arguing that greater speeds and applications will finally whet consumer appetite.

Among the upgrades is High Speed Downlink Packet Access (HSDPA) which, in practice, will offer speeds of 2 megabits per second (Mbps). As the name suggests, this will enhance download speeds, but is poor for uploading data. Corporate users who are sending large quantities of data will find it insufficient, as will domestic peer-to-peer users. An upgrade designed to fix this problem

is in development, although few networks have committed themselves to it.

Meanwhile, 1xEV-DO will also receive an upgrade in 2006, offering increased bandwidth and lower latency. A further revision will follow and is designed to improve the performance of applications such as voice-over-Internet protocol (VoIP) and video telephony. These in turn will make mobile telephony more desirable, as it allows calls to be routed to whichever VoIP-enabled device the recipient is using, whether that's an office phone, PC, or their mobile phone – all with just one number.

Then there is 4G. NTT DoCoMo, Motorola, Siemens and Wi-Lan are testing technology capable of providing mobile data rates of 100Mbps and 1 billion bits per second (Gbps) while stationary. 4G also includes the idea of 'pervasive networks', where users can simultaneously access and switch between wireless technologies seamlessly.

However, Peter Gardner, communications sector head at 3i is unimpressed: "Users still cannot get the full benefits of existing 3G and broadband wireless technologies. I'm keen to invest in businesses that really maximise the potential of current technologies."

WIMAX MOMENTUM

Among that next generation is Worldwide Interoperability for Microwave Access (WiMAX). It is considered the most mature and promising of the standards currently in development, since it offers benefits similar to Wireless Fidelity (WiFi) and broadband at long ranges. More than 330 companies, including Alcatel, Nokia and Intel, are backing the standardisation and certification work necessary for largescale WiMAX adoption.

It supports both fixed and mobile users moving over reasonable distances and will be able to provide speeds of between 512Kbps and 1.5Mbps, although advocates claim speeds up to 70Mbps will be possible. In contrast to a 3G transmitter, which typically covers a range of 3.5km, a WiMAX tower should be able to serve a radius of at least 15km.

Another technology, known as 'wireless mesh', is making small inroads in urban areas and works in a similar method to peer-to-peer applications. Each subscriber's receiver is also a transmitter, with the network transmitting data from receiver to receiver until it reaches its eventual destination. This means that previously inaccessible locations are able to connect through intermediate subscribers. Paradoxically, the more subscribers a mesh service has, the faster it becomes since there are more nodes to pass on data.

However, network expansion will be limited by the available radio spectrum. "Frequency availability and power level limitations will limit both range and data speed," says Forrester analyst Charles Golvin. "Europe is a regulatory mess when it comes to radio frequencies; there's little unregulated spectrum left." With WiFi frequencies almost universally available, it will be some time before laptops ship with both capabilities – let alone foregoing WiFi in favour of WiMAX.

LAST MILE

Fixed-line broadband suppliers are not letting developments pass by. Several Asian countries have long had access to fibre-based broadband that has given them speeds of up to 1Gbps for as little as US$90 a month in some areas.

Others are playing catch up, but one thing is clear – the infrastructure necessary to deliver ultra-high speeds is not in place in many countries, producing so-called 'last mile' problems. Solutions could include wireless technologies, networking via power lines or laying new fibre and copper wiring – an expensive proposition.

Increasing subscriber numbers will support this expansion. Fixed-line providers face little competition from mobile providers at the moment, since mobile's costs, quality and bandwidth make it less desirable in most situations. But, broadband uptake remains poor in Western Europe. Even in the US, little over 30% of households have cable or DSL-based connections. Market share will, therefore, be fought over content and capability.

One area of interest is machine-to-machine communications, whereby household appliances talk to each other via home networks and to manufacturers, service companies and others via the Internet. Fridges could order food to be delivered when they sense their stocks are low, or washing machines could request a repair call when they detect impending part-failures. Content will be able to move from device to device – subject to licensing restrictions – with television content jumping from set-top box to DVD recorder to PC to mobile and vice versa. Technologies such as WiFi, WiMAX and Ultra Wide Band will make these home networks a reality.

Another battleground will be Internet Protocol Television (IPTV), which delivers broadcast-quality TV over broadband and provides a single integrated phone, Internet and TV package. Unlike cable, which delivers multiple streams of data to a set-top box, IPTV sends only the programme, or stream of data, that the customer has requested. Telcos claim this will allow them to provide greater amounts of bandwidth, while detractors say the likely multiple users in homes will actually put greater demands on the backbone.

Jim Olson of SkyStream says: "IP is a unifying technology. The Internet grew up around IP: it gives choice, control, interactivity and portability between devices. It's causing more and more competition among various service providers. But the biggest IPTV activity is in the telco space, since it's easiest for them to implement."

Such developments underpin the notion of Web 2.0, in which a whole set of new applications and services will emerge now that the web is established as a high-speed platform. "The post-broadband era is underway," says Nick Kingsbury, global software head and partner, 3i. And that will require a seamlessness that is only available through ubiquitous broadband access – whether that is through wireless or fixed lines.

NEW BROADBAND TECHNOLOGIES

- **4G** – Successor to 3G and should offer speeds of 100Mbps to 1Gbps. Will go live between 2010 and 2015.
- **CDMA2000** – 1xEV-DO upgrade has already improved speeds, with Revisions A and B set to improve rates further.
- **W-CDMA** – Successor to GSM. Lagging behind CDMA2000 in worldwide subscriber numbers. Future upgrades, HSDPA and HSUPA, will improve speeds.
- **WiMAX** – Considered by some the best bet of the current batch. Wireless broadband technology with a footprint of 15km and more that will steal considerable amounts of 3G marketshare by 2010. Speed will lag behind the faster wired broadband technologies, such as fibre and ADSL2+.
- **Wireless mesh/mesh radio** – Peer-to-peer wireless technology designed to solve 'last mile' problems.

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