Future Mobile Handsets

WHITE PAPER

The future of mobile handsets: key markets and trends

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MARKET OVERVIEW

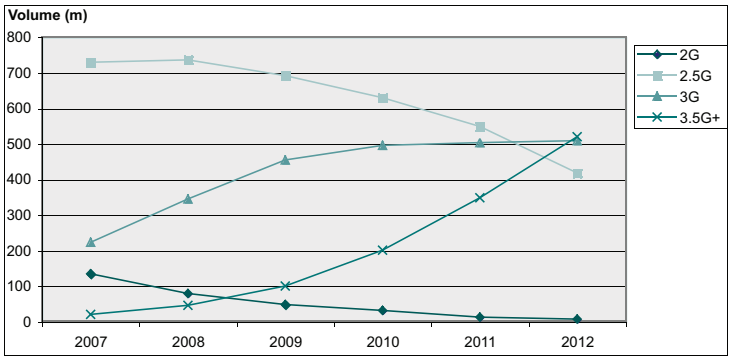
The worldwide market change towards higher data-rate networks and associated handset availability has meant that, by 2012, 'super 3G' devices will become the largest selling handset type, according to Informa Telecoms & Media. It reveals that while the rate of overall worldwide mobile handset growth will slow from 2008, super 3G devices will account for 35.8% of all handset sales in 2012, up from only 1.8% in 2007.

Overall, the global handset market has more than doubled in six short years, reaching 974.7 million handset volume sales in 2006. This buoyant growth is expected to slow from 2007 onwards, with annual growth rates eventually dipping under 10% from 2008. Total handset sales are forecast to pass the 1 billion mark for the first time in 2007, to reach an unprecedented 1,105.5 million, according to Informa. Global volume sales are not about to go in decline, rather there will be a degree of levelling out in shipment numbers to reach a still remarkable 1.452 billion units by 2012, a CAGR of just 5.6%.

But the market has become polarized. On the one hand, the emerging economies are experiencing large increases in subscriber numbers, driven by healthier economies and the availability of low-cost, entry-level handsets. They present a good opportunity to keep headline sales figures healthy, but the issue then becomes one of available margins. Yet in more developed regions with high penetration rates, growth is largely restricted to a more active replacement of handsets for those with leading designs and enhanced technical capabilities. To further aid growth in replacement markets, efficient handset segmentation will become increasingly important for promoting the adoption of advanced services that are being made possible by the network speeds offered by 3G networks and beyond.

While handset manufacturers are basing their business models on low margins and high-volume supply for basic phones and low feature phones, they are currently banking on high margins for feature rich phones, smartphones, value-added service (VAS) phones and mobile broadband devices supporting super 3G and higher generations. Given that the cost of these devices is still relatively high, manufacturers are forced to base their profit on the value of the device rather than on volume.

Global mobile handsets sales, by technology grouping, 2007-2012



Regional breakdown

For the past five years, Asia Pacific has been the world's largest handset market, with sales estimated at 360.3 million in 2006 – 30.8% of which were sold in China alone. Far from saturating, growth in the region is expected to increase dramatically over the next five years, with the total number of handsets sold each year increasing by 68% between 2006 and 2012. By 2012, 24.9% of all handsets sold will be super 3G, led by the markets of South Korea and Japan each with sales penetration of over 88%.

The next largest region in terms of total sales is Europe, which saw healthy growth from 2003-2005 following a fallow period. Sales for the region in 2006 stood at 252.4 million, with 63% taken by Western Europe although the East European market is steadily growing. Growth in Europe is expected to continue to 2012, reaching sales of 328 million in that year, but the annual growth rate is expected to slow from 2009 to less than 5% year-on-year. By then, super 3G is expected to form 63.7% of total sales, a larger volume than Asia-Pacific, with West Europe witnessing penetration of 85.7%.

North American handset sales reached 139.1 million in 2006, with growth anticipated to continue over the next three years. Sales by 2012 will reach 184.3 million, 62.8% taken by super 3G devices. The total market in Africa and the Middle East is also picking up pace, mainly through the large increases in subscriber numbers in what is a highly populated region with low penetration rates; it overtook the Latin American market in terms of volume sales for the first time in 2006. However, both regions are not expected to register more than 14% of super 3G sales by 2012.

FUNCTIONALITY

With replacement handsets required in high volumes in developed markets and increasingly so in emerging markets, the challenge of adding more features into a mobile device will continue for some time. The reducing cost and potential revenue earning opportunities of integrating a feature to a mobile handset will see features like GPS included in many high-end and some mid-tier devices by 2009. Convergence with the consumer electronics industries is already well underway as for some subscribers their mobile phone already replaces devices like digital cameras and MP3 players. It is these new features and capabilities that are ostensibly driving handset sales in developed markets, but they are also increasingly supporting and exploiting the potential of next-generation data networks, including super 3G services, wireless LAN and beyond.

The continued success of video and music on portable devices is inevitably pushing up their penetration onto handsets with expectations that over a third of mobile phones sold in 2007 will include video and nearly a quarter will have a music player. Informa believes the number of handsets sold with music capabilities will rise from 153.5 million in 2006 to 260.1 million in 2007 – a 69.4% increase. By 2012, the music phone segment will grow to more than one billion new unit sales, at which time over seven out of every 10 mobile handsets sold worldwide will be music-enabled.

In addition to the growing number of mobile video services offering TV content, it is the potential for digital media broadcasting receivers on handsets that operators are pinning their hopes on. Handsets built with mobile-broadcast-receiver technologies are expected to find their way into 12% of handsets sales by 2012 according to Informa with an inflection point expected in 2009 as network rollout and device availability allow the market to reach some level of critical mass.

REVISING BUSINESS MODELS

The recent success of most of the major handset vendors is largely a result of their performance on a number of criteria, including market segmentation, R&D and cost control. These factors will become even more important as market growth slows and strength of competition increases still further, which will be exacerbated by the arrival of convergence. The difficulty of succeeding in this arena has helped a small number of organisations dominate it for a number of years. The economies of scale and brand awareness enjoyed by the 'Top Five' handset vendors help them offset the erosion of average selling prices (ASPs) that will continue in the industry.

However, reducing ASPs and competition are forcing a number of leading handset vendors to revise their business models, despite the margins some of them enjoy. They are seeking to diversify their revenue streams, particularly to include content, investing in new markets that they feel will bring them greater financial returns. The advent of convergence is enabling many of these companies to explore, through acquisition or partnership, the delivery of content, with mobile as the main but not the only delivery mechanism.

In addition, convergence is threatening to rewrite the rules within the mobile handset value chain. The introduction of new technologies could undermine the position of both the mobile network operators and also device vendors if they do not respond. The potential to offer more compelling experiences on mobile devices is encouraging new entrants to consider entering the lucrative mobile handset industry. The interest of companies such as Apple and Google in the mobile space is challenging some established industry practices, with the former reportedly enjoying a share of content revenues generated on the device and the latter potentially in a position to become a leading phone and Internet ISP.

Controlling costs and maintaining margins

With less revenue being generated by each handset, on average, vendors looking to maintain or increase revenues need to increase their sales volumes, while at the same time improving margins through efficient cost control. It is the objective of all handset manufacturers to control cost while bringing innovation in order to increase margins. In an era where competition is intensifying and price war among manufacturers is not diminishing, cost optimisation has become ever more crucial. The race towards intellectual property (IP) acquisitions by the leading players, such as Nokia, Qualcomm and NXP, is also a symptom of the need to reduce costs and increase margins.

ASPs are reducing by about 8% year on year across the top five vendors, due to three main factors: increasing competition; the desire to sell greater volumes at the low end; and the reducing costs of technologies. Informa expects overall prices of different hardware and software components to decline slightly over the next two years, but some components, such as processors and memory, will halve every two years depending on the level of competition as well as on volume demand. The average bill of materials (BOM) of a mobile handset is expected to decline from US$102 in 2006 to US$86 in 2012. However, it is important to note that increased complexity in devices, plus the desire for added functionality and features, comes at an increased cost. Single-chip designs have significantly helped in pushing down cost. Another increasingly vital element is software.

The average cost of 3G phones across all ranges of feature sets and segments will drop significantly within the next two years thanks to the growing economies of scale as mobile operators are currently migrating subscribers from 2.5G to 3G services. The aggressive decline in the average BOM of 3G devices is expected to continue in 2008 where it will reach US$112. After 2008, the year-on-year decline in the BOM of these devices will slow down, reaching US$55 in 2012.

Super 3G mobile broadband handsets are relatively costly to manufacture. Informa expects to see only a slight decrease in the manufacturing costs of mobile broadband chipsets because of the complexity of designing, testing and implementing these components. It will therefore take some time for mobile broadband chipset technology to mature. Consequently the average BOM of mobile broadband devices is forecast to reduce with an average year-on-year decline of 6% until 2010. After 2009, sales of these devices is likely to take off sharply and as a consequence the BOM related to them is expected to drop at an average of 17% year-on-year to reach US$153.50 in 2012.

MOBILE SOFTWARE

History has shown that, in many industries, a move from proprietary technology to more open and interoperable technology has enabled expansion of the market. In the mobile industry, third-party software and hardware development has created a lot of interest in open operating systems (OSs). The OSs in the mobile handset market are currently shifting from being proprietary platforms to more open systems, with continual improvement of the application programming interface (API) and user interface (UI).

During the last few years, substantial progress has been made in the development of hardware solutions for mobile devices, which will undoubtedly encourage the development of software solutions. Only collaboration between software solution providers and hardware manufacturers will enable the necessary advances in handsets to be realised if they are to support future generation mobile wireless communications services.

As the move towards mobile broadband gathers pace, the majority of handset manufacturers will gradually move from proprietary to either open architecture or semi-open architecture, a proprietary OS topped by virtual-machine (VM) platform with an open API and/or open UI.

Over the next few years, smartphone OS vendors will seek to broaden their appeal as they take advantage of the fall in cost of integrating advanced computing power into handsets and the clear consumer benefits brought by native applications. Thus smartphone OSs will become a competitive alternative to proprietary OSs in some feature rich devices. At the same time, operators will welcome the adoption of a smaller number of mobile OS platforms so that content can be made available to a wider audience.

Moreover, while the introduction of Apple has clearly changed the dynamics of the smartphone market, it is the open OS category that will dominate smartphone sales over the next five years. Undoubtedly, the chief reason for this is openness. With an open architecture, an OS such as Symbian or Microsoft WM attracts a large developer community, which in turn generates a high volume of quality content available for download from a wide range of sources. The size of the developer community and the variety of distribution channels for this type of device has the effect of reducing prices, which has been heightened by the added reduction in royalty payments. Furthermore, as open smartphone OSs are not controlled solely by one handset vendor, unlike that for RIM's Blackberry and Apple's iPhone, their appeal and their financing for R&D is wider than these 'proprietary' smartphone OSs. It also allows for greater consumer choice and operator handset selection.

The global smartphone market has seen healthy sales growth over the past few years, driven mainly by the open OS segment. This is expected to continue for the next five years as handset OS vendors focus on developing suitable systems to address more of the feature rich segment and, most probably, even the lower handset tiers. Of the 72.1 million smartphones sold globally in 2006, open OS powered devices represented 91% of the smartphone market.

The increased interest in smartphone OS (both open and proprietary) will see smartphones grow strongly in 2007, rising 40.7% to 111.6 million unit sales. The increasing sales of these devices are due to their growing multimedia capabilities and computing power, overall decreases in cost and the mounting share that they will take from the feature rich non-smartphone segment. The ability to download and use a wide range of native applications greatly increases device usability. By 2012, Informa Telecoms & Media expects around 30.3% of all handsets sold that year to be in the smartphone category, up from only 8.2% in 2006.

Smartphone market

For 2006, Informa Telecoms & Media estimates that Symbian represented 65.1% of the total smartphone market (including proprietary OS), with Linux and Microsoft accounting for 14.2% and 7.3% respectively. Other open OS devices, notably using PalmSource, generated about 3.4 million sales in 2006, 4.3% of total.

Symbian will retain its lead in the open OS market thanks to its impressive multimedia capabilities, revised licensing structure and ongoing work on developing a more modular implementation approach. Furthermore it is maintaining its branding strategy, which in time may be seen as an additional reason for purchase of a device. All of this will encourage Symbian to be used in handsets in progressively lower tiers.

Informa Telecoms & Media has revised down its near-term forecast for Microsoft-powered mobile handsets as the mix of smartphones to handheld PCs was lower than estimates initially suggested. This has resulted in Microsoft registering a share of 7.3% of all smartphones sold in 2006, which is expected to rise to 10.5% in 2007 to reach 11.7 million. However, with an increasing number of handset vendors looking to adopt the OS in the future, it is now forecast to grow to represent 23.9% of all smartphone sales in 2012.

Linux was the second most popular open OS for smartphones sold during 2006, largely in Asia Pacific, where Japan and China made up the largest share. In 2007, Linux OS will grow its share to 15.7% and continue this trend to 2012 when it will form 26.6% of all smartphone sales. Its sales are forecast to grow strongly in the mid-term due to the large number of new device launches from a variety of vendors. Increases in Linux shipments and its arrival into lower tiers of handsets are closely linked with hardware evolution. However, given its low cost and high level of granularity, it will compete strongly with Symbian in the growing category of smartphone-powered feature rich devices.

While Apple has fixed industry attention with its stylish looks and superior user interface, its overall effect on the operating system space is not likely to be as stark. Under Informa Telecoms & Media OS definitions, it joins RIM's Blackberry as one of two main OSs deemed as being proprietary that operate in the high-end device space. While both offer smartphone multitasking and computing power, they are not 'open' in the strictest sense and thus do not run native applications efficiently.

Referred to as 'semi-open proprietary', Apple and Blackberry OSs are developed in-house and incorporated into some models designed by the device vendor. Over time, it is expected that these OSs will become increasingly open to third-party application developers but they are unlikely to be embedded in to non-in-house models. That is to say that it is unlikely for the foreseeable future that the software will be licensed to other handset vendors as it is with, say, Symbian or Microsoft .

With this in mind, the semi-proprietary segment accounted for around 9% of the total smartphone market in 2006, equating to only 0.7% of the total handset sales market. While the introduction of Apple will undoubtedly push up the number of unit sales, this segment is not forecast to grow as fast as the remaining parts of the smartphone market.

Between 2006 and 2012, sales of smartphones with a semi-proprietary OS are now forecast to continue growing where previous Informa Telecoms & Media forecasts had them in decline from 2008. Most of this is down to Apple entering the market, which is now included in this segment. As such, Informa Telecoms & Media estimates that there will be 9.5 million handsets sold in the proprietary OS category, up 32% on 2006 volume sales. Sales are expected to continue growing to 2012, although not at a rate as fast as the overall smartphone market. Sales will finish at 17.3 million in 2012 although the share of total smartphone sales will fall to 3.9% from 8.5% in 2007.

The rise of Open Source

As open source software is making its way into the mobile industry, popular beliefs on the nature and scope of open source need to be fundamentally questioned. Open source does not just mean access to source code, it has further implications in terms of the ability to modify, distribute or deploy a derived product, whether that is sold commercially or offered free of charge. There are three distinct definitions for the term open source today:

- Open source as software that comes with an OSI-certified licence.
- A movement in the development community for making source code freely available.
- Open source as a collaborative development methodology.

At the beginning of the decade, Linux was one of the few commercial success stories in the domain of open source software. In 2007, the story is very different. Numerous examples exist today of the application of open source principles to create successful software products. Importantly, a range of business models has been documented on how to make money using open source. The most prominent community success stories of open source software today include the Mozilla browser, Apache web server, Open Office and Asterisk.

However, Linux is still by far the most commonly associated with open source. Countless operating system variants exist today labelled as 'Linux', but in essence they are based on the same kernel, which is derived from a single but continuously evolving source at kernel.org. However, creating a mobile handset operating system based on Linux is a complex undertaking. Until mid-2006, Linux operating systems were only appealing to well-resourced manufacturers wishing to invest in open source.

The openness of Linux at the source code level is a strong advantage, which could boost its development. However, this factor could also work against it because different manufacturers could easily appropriate and modify the original Linux code and use it as a proprietary technology for powering their devices, hence significantly fragmenting the Linux market. Use of Linux-based operating systems may require significant financial and organisational commitments from handset manufacturers. At the same time, they offer distinct and in some cases unique advantages to manufacturers, compared with proprietary or semi-closed operating systems such as Symbian OS (with S60, UIQ or MOAP), Windows Mobile and Windows CE.

However, while fragmentation across various points of Linux-based operating systems does present challenges for application developers, these challenges can be mitigated when there is sufficient developing interest. Naturally, Linux-based operating systems offer distinct advantages but they are no panacea for handset manufacturers and Linux does presents a number of challenges for handset manufacturers.

Benefits and challenges of Linux to the mobile industry today

Benefits	Challenges
Choices: wealth of suppliers, and easy access to source code.	Platform development cost, primarily due to cost developing core applications
Control: reduces supplier lock-in, allows complete control of roadmap.	Linux appeals mostly to well-resourced OEMs with high production values
Scalability: scales access phone tiers and across phone segments.	Unnecessary API fragmentation, leading to higher integration costs and slower adoption
Quality: lower defect count due to peer review process.	Linux kernel requiring extensive optimisations to cater to mobile phone operating conditions.
Innovation: full across to source code makes Linux a preferred platform for innovators	Testing and operator specification requirements stalling entry of mobile Linux in Europe and the US.
	Legal issues not understood, stalling Linux adoption.

Source: Informa Telecoms & Media

The role of the UI and user experience

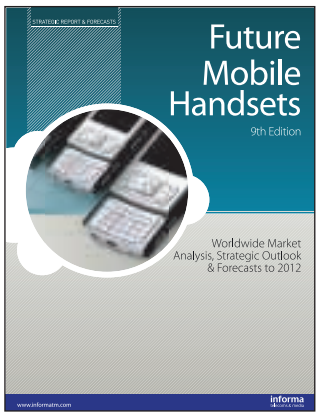
The handset user interface (UI) is currently playing a significant role in winning user acceptance for data services. This trend is already evident as major vendors are tailoring the software that drives the UI of their handsets to the specifications of some of the world's largest mobile carriers. At the same time, a number of software and middleware vendors are marketing their own products for designing and customising a number of user interface aspects from the UI skin to active idle screen, on-device portals (ODP) and dynamic user interface (DUI).

A number of user input/output methods and predictive application and feature discovery solutions, such as predictive text input, voice recognition, active idle screen, on device-portals, soft-key and multi-touch screen capabilities, have surfaced in recent years to address the need to ease features accessibility and service discovery on the handset. Vendors such as Abaxia, Tegic, Zi and, now, Apple offer predictive search functionality from the idle screen that allows the user to quickly and intuitively access handset features and services and list group of applications in a hierarchical order. Predictive search and hierarchical listing could also solve the downside of handset sophistication by enabling users to easily locate particular applications from a long list of applications stored either in the device or at the server. These navigation paradigms can provide consistent, repeatable access to common handset features and applications which significantly enhance the user experience.

In addition a number of intelligent search and hierarchical listing solutions are currently offered to facilitate service access and application discovery. The combination of predictive service discovery and hierarchical listing can be used from the idle screen to list the most likely service applications available in response to a user query, similar to predictive search for handset features. The iPhone visual-mail is an explicit example demonstrating such capabilities.

But the complexity of UI design is increasing due to the growing number of features and services included in phones. This growing challenge is made more difficult as the pressure to reduce time-to-market has not diminished. Device vendors need to increase the flexibility of their UI software to respond to the requirements of operators better.

The UI is central to the success of next-generation mobile operators' services as well as being appropriate for simple voice and messaging service usage. Operators have responded to this by developing sets of requirements over and above simple customised UI branding – the display of the operator logo, wallpapers, screen savers, ring tones and icons. Indeed, vendors are facing strong pressure from operators and service providers to adapt the UI with customised features to improve service usability and facilitate the promotion of branded content.



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David focuses on mobile handset developments and vendor strategies worldwide. Over the past 5 years he has built up an in-depth knowledge of the market developing in-house original online research amongst Informa Telecoms & Media's extensive database of telecoms professionals.

David has 12 years experience in the telecoms research and consulting sector and has gained first hand experience in the handset markets' needs and requirements. At Informa Telecoms & Media, David is the lead author on a range of strategic reports including: Future Mobile Handsets, Mobile Application Platforms and Operating Systems, and Mobile TV. David is a frequent speaker and chair at international conferences and has made many presentations on current trends and future development of mobile handsets and devices.

About the report:

Now in its 9th edition, Future Mobile Handsets is the definitive guide to the worldwide handsets market. The report provides unrivalled coverage and in-depth analysis of mobile handset device trends, highlighting the important role they will play in supporting future generation wireless communications networks.

Future Mobile Handsets is the industry leading source, essential for understanding the critical elements in the dynamic and fast moving market, providing insightful competitive analysis of the entire industry value chain and associated market issues.

NEW IN THIS EDITION:

- **Detailed forecasts for 2.5G, 3G and now 3.5G** handsets by region from 2007 – 2012 including: HSDPA, HSUPA, CDMA 1xEV-DO Rev A & CDMA 1xEV-DO Rev B
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