

# OSiM 2007

OPEN SOURCE IN **MOBILE**

WHITE PAPER



## Five defining traits of mobile open source

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# Five defining traits of mobile open source

Open source software is one of the most hyped, misunderstood, feared and high impact phenomena in the software industry today. In the last two years, open source has been making a significant impact on the mobile industry. Led by Motorola, NEC, Panasonic and Samsung, several handset OEMs and ODMs have released Linux handsets, while open source software has been adopted by Sun, Google, Adobe, BT, Trolltech and Funambol for use in key products.

This paper analyses five traits which characterise open source software and its impact in the mobile industry, ranging from community culture, to what open source means for mobile Linux, browsers and Java. A summary of forecasts on Linux and Java market penetration to 2012 appears at the end of this paper.

The reader is referred to Informa's just published *Open Source In Mobile: 2007-2012* strategic report for a comprehensive analysis of open source, from economics to licenses and from Linux to Java, browsers and mobile networks. The report also forecasts the rapid growth of mobile Linux and Java penetration by region and segment for the next five years.

## 1. What on earth is open source?

- Open source software is one of the most hyped developments in the software industry today. The success of Linux, from a pet project to Microsoft's arch-rival operating system has fostered a belief in for the success of the open source model. The unconventional business models where open source is employed offer plenty of opportunity for misconceptions. Open source has also given rise to fear of IP contamination due to the 'copyleft' properties of the GPL license. At the same time, open source software has impacted on many facets of the PC and mobile industries, from operating systems to browsers.
- So what on earth is open source? A Google search produces more than 25 distinct definitions of open source, each one from a different perspective. In practice, there are three distinct contexts in which open source is used today:
- **Software that comes with an OSI-certified license.** The Open Source Initiative (OSI) is a non-profit organisation tasked with maintaining and promoting the definition of open source. The OSI defines 10 criteria for open source software, including that open source software must be freely distributable with access to source code and redistribution of modifications. Hundreds of open source-like licenses exist, of which the OSI has approved nearly 60. The vast majority of open source projects have been licensed under the GPL, the LGPL, the Mozilla Public License (MPL), the BSD License, the Apache Software License, and the MIT License.
- **A social movement for making source code freely available.** For many, open source represents a social movement among software development communities. This movement supports the principle that software should be freely available to anyone interested in using it, modifying it or redistributing it. Community-based development and viral distribution are important characteristics of this movement. The very term 'open source' was coined to avoid misunderstandings arising from the earlier term 'free software'.
- **Open source as a collaborative development methodology.** From a business perspective, open source is a collaborative software development methodology whereby a community of entities and individuals (commercial, non-profit or entirely voluntary) develop software through a transparent, distributed peer review process. Open source development can pool community efforts towards development of a software base that is of common interest to all participating parties, while allowing differentiation through derivatives built upon this software base. In this sense, open source as a business model is the polar opposite to commercial forums, which foster collaboration through exclusive or paid-for membership. Yet in some cases open source development may be equally or more effective at achieving the same goal. An example of a successful open-source based collaborative software development effort is the Eclipse non-profit foundation which is backed by over 150 industry players, including heavyweights Google, HP, IBM, Intel, Motorola, Nokia and Wind River Systems.
- Open source started in the early 90s as a social movement in favour of maintaining software freedom; the development of the Linux kernel as a free Unix alternative and the creation of the GPL license were the two defining milestones of that movement. Yet 15 years on, open source has evolved gradually and perhaps unexpectedly into one of the most successful methodologies for commercial, collaborative software development.

## 2. Turning corporate software development on its head

Open source is in many ways the antithesis of corporate software development. The culture and dynamics of OSS development are defined by the nuances of a software community collaborating over the Internet. A community is typically formed by a combination of paid-for, pro-bono and hobbyist software developers with the same motivation towards solving a particular problem ('scratching an itch' in open source lingo). Community members are motivated by personal needs, peer recognition and last (and often least) financial reward. Communities are formed and organised ad-hoc around opinion leaders who are recognised based on the merit of their contributions to the community. This environment defies most rules of corporate software development:

**Processes and roadmaps:** The mobile industry is accustomed to 100% specified and controlled development environments. However, thousands of open source software projects thrive despite a lack of project requirements and feature roadmaps. Open source development addresses features on an ad hoc basis; OSS projects are thereby evolved, not designed, driven by the needs and wants of individual developers or commercial participants into Linux development.

**Partner selection and management:** Corporate software development projects rely on warranties, indemnity clauses, non-disclosure agreements and service-level and marketing agreements. Each agreement is unique to the customer-supplier relationship and takes months to set up, adding up to expensive relationship management. Moreover, software suppliers are chosen based on RFIs and RFPs which often consume extensive resources and time. By contrast, open source software comes under oft-used licenses such as the GPL, LGPL and BSD, irrespective of the entities using or developing the software. Use of a few well-understood licenses in open source projects results in significantly reduced product time-to-development and time-to-market precluding customer-supplier negotiations. Moreover, the qualities of a software supplier are often evident through their OSS works, which are open to the community for inspection.

**Reversed customer-supplier relationship.** In corporate software projects, the customer dictates conditions to the supplier and has control over project requirements, deliverables and roadmap. In open source projects, even if these are sponsored by a commercial entity, the community is the one who owns the project, not the sponsor. It is the norm for the sponsor's corporate agenda to be in antithesis with the incentives of the community members; in these cases the community may take the project in a direction well beyond the control and the desire of the sponsor. As such, the customer-supplier relationship is reversed in open source projects. The community, which may be likened to the supplier, becomes the customer who must be appeased. Managing open source projects can be likened to walking on a tightrope, finely balancing the corporate agenda with community incentives. To win the community's heart, sponsors must dedicate efforts, creativity and resources to the community.

**Innovation:** Innovation in the software industry is almost always driven top-down; market segmentation and customer requirements filter all the way down to floor-level product decisions. Open source software is completely different. Innovation is entirely anarchic and ad hoc, often resulting in genuinely fresh concepts and product usage scenarios.

## 3. Mobile Linux is not about free software

Linux is by far the software most commonly associated with (and often mis-identified with) open source and free software, where free refers to liberty, not costs. However the access to source code, ability to modify or redistribute, or the royalty-free nature of Linux are hardly the reasons why four out of five handset OEMs have adopted Linux. Mobile Linux has not been adopted just because of its 'free software' qualities.

In 2007, handset OEMs have adopted Linux to varying degrees, from Motorola's portfolio-wide Linux strategy to Nokia's Internet Tablets segment-specific strategic experiment with Linux. The reasons behind the almost-unanimous OEM turn towards Linux are as follows:

**Reduced cost and time-to-market.** The availability of a stable, highly portable Linux kernel, hundreds of supporting royalty-free middleware components, thousands of Linux developer enthusiasts and a growing number of commercial mobile Linux software and service providers mean that mobile Linux is an effective operating system for mobile handsets, both in terms of time-to-market and cost of development. According to Nokia, one of the most successful corporate entities in working with open source, "Linux is the launching pad you need to stand on to be productive. We have never managed to bring out a product in such a short time, with so few resources".

**Wider choice:** handset manufacturers have considerable freedom in selecting the middleware components of choice whether from open source communities, or in some cases from closed-source commercial components. A healthy market exists in Linux-based software components such as graphics frameworks (e.g. GTK+, Qt Core, FluffyPants), application environments (e.g. Qtopia, Hiker, Hildon, OpenMoko, SKY-MAP), multimedia frameworks, PIM middleware, file systems and telephony APIs.

**Strategic control:** Linux-based operating systems afford manufacturers almost as much control of the platform roadmap as their in-house OSs. Manufacturers are much less dependent on a single software supplier, effectively lowering the cost of switching suppliers, an important strategic consideration. Furthermore, manufacturers are able to steer platform development of their own Linux OS variant in any direction they wish.

**Scalability:** The Linux kernel has evolved over the years, to be one of the most scalable and reliable operating systems, powering commercial mobile devices from low-end single-core feature phones to high-end smartphones. Manufacturers may easily trim unnecessary features or add high-end features such as USB support and VoIP protocols which are widely available for Linux distributions for PCs.

**Quality:** Peer-review of popular Linux-based open source software provides for fewer software defects ('bugs'). Both Nokia and Panasonic report that Linux-based software for mobile handsets has a high quality and very few bugs, compared to typical in-house software

**Innovation:** The open, decentralised nature of Linux backed by strong developer communities makes Linux-based operating systems a good choice for cultivating innovation. Chances are, a component will be already available somewhere in the Linux community ecosystem and can be adapted to a mobile Linux OS.

#### 4. Open source is shaking up the mobile browser market

Open source in mobile goes far beyond the confines of Linux-based operating systems for mobile phones. Examples are Sun's Java, Motorola's MIDP3 project, Microsoft's Shared Source Initiative, Symbian's use of open source, Adobe's project Tamarin, Nokia's S60 web browser, Funambol's MDM server, the Eclipse Foundation's open source development tools and the rising interest in open source hardware.

One of the biggest disruptions created by open source is in the case of mobile browsers. From 2003, the mobile browser market had been dominated by three heavyweights, Openwave, Teleca (Obigo) and ACCESS (in addition to in-house browsers used by major OEMs). These companies had been responsible for the majority of mobile browsers shipped, while few manufacturers – most notably Nokia – had not only been sourcing browsers from third parties but also developing their own browser software in-house.

However, in the last few years, the browser market has been facing a number of challenges, namely:

- mobile browser per-unit royalties have been continually dropping, following the trend of software commoditisation. It is believed that browsers for mass-market phones today sell at a few pence per device.
- mobile browsers are inherently complex software, which have to cope with rendering malformed HTML (often called 'street HTML'), the numerous evolving W3C standards around HTML, CSS and ECMAScript and the proprietary vendor extensions (e.g. rendering pages designed for Internet Explorer).
- as operator walled gardens are opening, mobile devices are being exposed to the wilderness of billions of web (HTML) pages, as opposed to thousands of simplified WAP pages that were previously the norm. The complexity and diversity of these web pages have called for advanced browsers, which typically take years to iteratively mature, as browser vendor Opera attests.
- the differentiating features of mobile browsers lie not in the HTML parsing and the rendering engine, but in the value-added features, such as intelligent zoom and navigation.

As these pressures were mounting, a critical point was reached in May 2007; within the space of one week, mobile browser vendor Teleca announced that it 'had halted investments into renewal of Obigo product', while Openwave announced it was up for sale following a 50% tumble of its share price in 12 months. The industry impact has been significant, given that the Openwave and Obigo browser families have claimed the lion's share of the mobile browser market.

Behind the scenes, this blow to the mobile browser business was struck primarily by Nokia's S60 WebKit, Nokia's newest browser based on an open source rendering and scripting engine for web pages. While business execution errors may have affected the demise of Obigo and Openwave's business, it is the availability of WebKit, a reliable, open source, core browser engine that essentially drove browser pricing down. Nokia's move towards WebKit also displaced some of its previous browser suppliers who lost a major customer. Furthermore, the open source WebKit has been developed into a first-class browser engine, under the auspices of Nokia, Apple and KDE. The corporate and community backing of WebKit implies that any further efforts to develop proprietary browsers is unlikely to be viable (although Opera and Access are still maintaining their proprietary browser products at the time of writing).

## 5. Sun's open source Java policy will mean very little for the mobile industry

In early November 2006, Sun proclaimed the most significant shift in Java strategy since the launch of the software platform in 1995. The US software giant announced that it is licensing several key components of the Java for mobile (Java ME) and desktop (Java SE) platforms under an open source license. With this move, Sun provides Java ME and Java SE platform reference implementations not only under its traditional commercial license terms, but also under open source license (GPL) terms. Furthermore, Sun has created a web-based repository for open source Java projects (the Mobile & Embedded community), and announced a governance model for it. It is worth stressing that the Java Community Process (JCP), the process by which third parties can play a role in the future of the Java platforms, remains unaffected.

With the open source strategy, Sun's goal is likely to incentivise the industry into adopting a single reference Java implementation and mitigate the threat from rapid market penetration of Adobe's Flash as well as other competing application environments such as BREW.

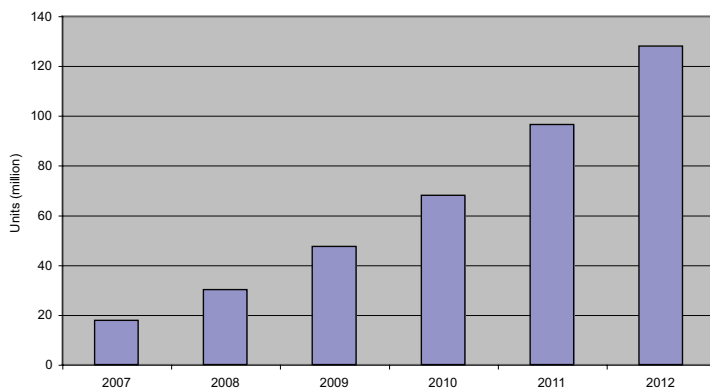
To estimate the implications that Sun's Java open source strategy will have in the mobile industry, one should consider three fundamental elements of Sun's licensing and trademark policies.

1. Sun's choice of GPL license requires third party modifications to be also distributed under GPL for no charge. This dis-incentivises handset manufacturers from even accessing GPL code due to IP contamination concerns. The only exception is when most of the handset software is licensed under GPL (e.g. OpenMoko distribution), although this is extremely rare.
2. Sun Microsystems retains a trademark to the Java term and has a copyright on the cup & steam logo. Sun requires handset OEMs and Java implementation vendors to pass TCK certification tests for the base CLDC and CDC platforms (at a considerable cost) in order to be able to claim that their handsets are Java compatible.
3. Sun's open source Java phoneME Feature and Advance projects are reference implementations, which have not been optimised for specific phone hardware. Handset manufacturers today compete heavily on Java platform optimisation to accelerate the performance of Java applications and games as a means of differentiation. Reference implementations and third party contributions to these implementations are unlikely to offer significant advancements in terms of optimisations, simply because software platforms for feature phones (perhaps with the exception of smartphones) are closed by nature and typically inaccessible to third parties. On the other hand, it should be noted that virtually all of Sun's active development for its commercial (licensed) implementations is currently done in the phoneME feature and advanced open source projects. As such, the phoneME code base will typically include platform features which are in the commercial version.

As a result, Informa Telecoms & Media believes that Sun's Java open source policy will change very little in the mobile industry. On the contrary, Motorola's intentions for releasing Java MIDP3 under open source will likely see more uniform adoption and consistent implementation of MIDP3 across mobile handsets for three reasons; firstly Motorola's MIDP3 implementation is optimised for ARM hardware and is not a reference implementation; secondly both the MIDP3 reference implementation and TCK test suite will be open sourced and thirdly these will be licensed under an MEL (and subsequently under a more liberal Apache License) encouraging OEMs to adopt Motorola's MIDP3 implementation for their handsets.

## Appendix: Linux and Java forecast to grow aggressively to 2012

Open source is set to shake up the mobile industry, not only in terms of browsers, but also in terms of the market penetration of Linux and Java software globally.



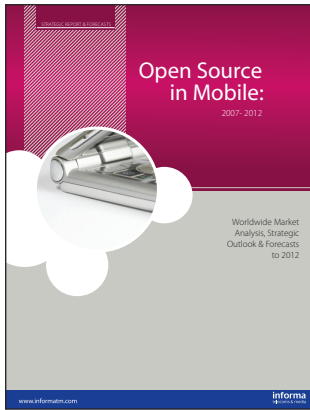
**Figure 1.1: Global Linux OS handset sales**

**Source: Informa Telecoms and Media, Open Source in Mobile: 2007-2012**

Linux was the second most popular OS for smartphones sold worldwide during 2006, according to Informa Telecoms & Media. Approximately 11.7 million devices were sold, the vast majority in Asia Pacific, where Japan and China made up the largest share. In 2007, the OS is expected to grow its market share to 17.3% and will then gain further share from 2008 onwards as it is increasingly used in Europe and North America. By 2010, sales volumes of Linux-powered mobile handsets will have almost quadrupled since 2007, and by 2012 Informa Telecoms & Media expect sales to have reached 128 million devices. This equates to around a 27% share of the total smartphone market and 8.8% of all handsets sold that year.

In terms of Java, over 50% of handset sales are forecast to be Java-enabled in 2007. Informa Telecoms & Media expects Java enabled handset sales to grow strongly to 2010 so that they will represent over 77% of all new handset sales in that year and by 2012 there are forecast to be 1.21 billion Java-enabled handset sales (equating to 83.3% of the total).

Java growth in the coming years owes much to the continued growth in low end handsets for developing markets and re-stimulation in the technology by the imminent introduction of MIDP3 and the open sourcing of some Java APIs, including MIDP3, location based services and Bluetooth. Informa Telecoms & Media estimates that MIDP 1.0 will account for the largest proportion of devices to 2009 when it will be superseded by MIDP 2.0. Scheduled to be released on handsets in 2008, MIDP 3.0 is forecast to hold about a third of the market by 2012.



## Open Source in Mobile: 2007-2012 report

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Andreas Constantinou is both a strategist and mobile technology expert. He is the founder of VisionMobile, a market know-how firm delivering sector analysis on the handset ecosystem, open source and mobile service domains. Andreas is also the author of Informa's strategic report on Open Source in Mobile. Andreas has eight years' experience in research, development and strategy in wireless. He specialises in mobile handsets, open source, the mobile software market, device management and operator strategy. Andreas has worked on several product and marketing strategy projects for clients including France Telecom, T-Mobile, OMT, Teleca, Red Bend, Abaxia and Trolltech, and authored numerous research reports for analyst firms Informa, Ovum and ARCchart. He specialises in providing intelligence on the mobile vendor landscape, analysing market dynamics and identifying mobile industry trends. When not hopping on planes, Andreas spends his time between Athens and London.

#### About the report:

**Open Source in Mobile** is your definitive guide to open source software developments across the global mobile handset market and delivers everything you need to ensure that you fully understand the future of this important sector and the impact it will have on telecom markets worldwide. With unique market forecasts, in-depth analysis and independent case studies, this essential strategic report enables you to monitor the latest open source software developments and assess market potential to 2012.

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