

White paper on
Mobile OS and efforts towards open standards

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Executive Summary:

This paper provides an overview of Smartphone platforms standards and a discussion on development efforts and the future of open standards.

Mobile phones are emerging from mere communicative devices to a software-intensive devices like PCs and almost every manufacturer have stepped up to focus on creating more innovative mobile operating platforms. The conclusive success of a platform entirely depends on its adaptability to the third-party apps and ultimately, it constructs the global market. In the recent years, since the launch of the Smartphone, it has proved itself to be an end-to-end mobile communication solution for the global mobile users. Now, with the introduction of the various Mobile operating systems, the major Smartphone companies are creating a monopoly of securing the information system. They drive the open-standard users and mobile phone operators to receive custom content, which are not common carrier functions and are delivered to users as a closed set or exclusive set of information services.

Smartphone OS:

The 'Smartphone market' has very specific requirements that make it different from the markets for PCs and other mobile phones. Scaling down a PC-OS and to have communication capabilities within a small and basic OS, ends in various fundamental compromises. The characteristics that build smartphone markets is unique and calls for a comprehensively designed OS.

a. Smartphones are small & handy:

Mobile phones are both small and, by definition, mobile. The mobile phone usage environment requires them to be able to have enough battery capacity to support long talk time without need to change them frequently. These expectations make considerable demand on power management. Also the devices need to be responsive in all situations, and cannot afford to go through a long boot sequence when it is turned on. In fact, the device should never be powered down completely since it needs to activate timed alarms or handle incoming calls. At the same time, a mobile phone must provide many hours of operation on a single charge or a set of batteries. Meeting these contradictory requirements can only be done if the whole OS is designed for efficiency.

b. Multiple, Frequent and continuous connectivity

Smartphones are occasionally connected

- To the wireless phone network locally
- To other devices

- To their own applications etc.

Accessing a particular data, managing Emails using an internal-client or synchronization needs various types of connection. Mobility difficulties usually make a wireless connection preferable-whether mobile network or personal area (e.g. infrared, Bluetooth). Wireless connectivity is, sometimes patchy, with number of protocols worldwide & fade-outs, while roaming in poor coverage area. Those kind of connectivity environment requires that operating system should be able to maintain connection by integrating utilities to manage dropped connections, gracefully and inform the user, immediately.

c. Products diversity

Smartphones have evolved from traditional cellular phones with main input via the keypad, to a candybar or tablet form factor phones, operated with a styli, larger screens and small keyboards. The changing input mechanisms and form factors sizably influence the intended primary use of mobile deveices and hence, OS design.

d. Open platform

The platform has to be open enough to accommodate independent third party technology and should make ways to software vendors to develop third-party applications. So as to reduce the time-to-market, OS should provide the developers, the support of standards already available or which can be easily coded for making the platform more open to attract more developers.

e. Limited Memory

To fit into the limited amount of memory a smartphone have, the OS must be very compact to provide required rich set of functionalities.

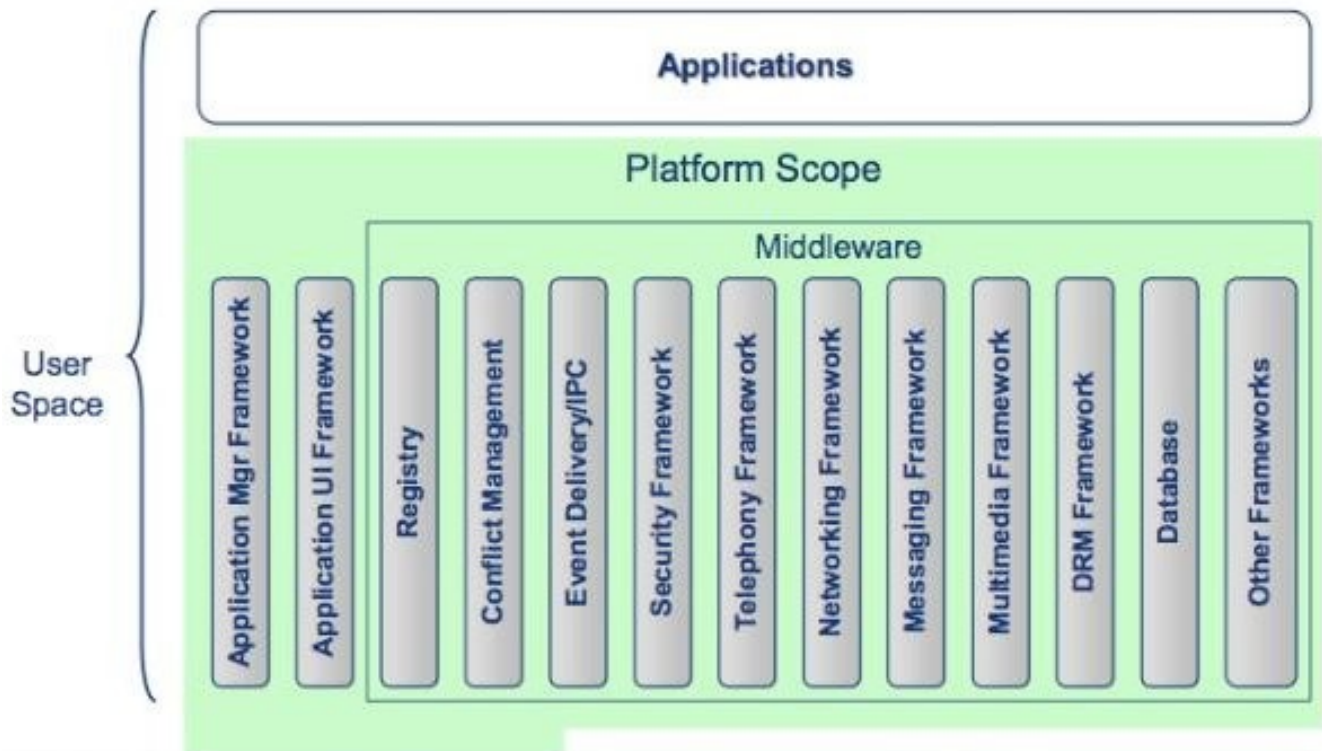
Types of Smartphone OS platforms:

The Smartphone OS can be differentiated, based on the existing operating systems used by computers.

a.Real-Time Operating System (RTOS)

Real-Time Operating System which responds to inputs, immediately and generates results, instantly. This type of system is usually used to control scientific devices and similar small instruments where memory and resources are crucial and constricted. This type of devices have very limited or zero-end user utilities, so more effort goes into making the OS really memory efficient and fast (less coding), so as to minimize the execution time ,in turn saving on power as well. e.g.: 8086 etc.

Mobile operating system framework



b. Single user, single tasking operation system

This type of OS is better version of Real time OS, where one user can do effectively one thing at a time, which means that doing more than one thing at a time is difficult in this type of OS. For instance: The palm OS in palm hand held computer is an example of single-task OS.

c. Single user, multi tasking operating system

It allows more than one program to run concurrently like printing, scanning, word processing etc. e.g. MS Windows and Apple's Mac OS.

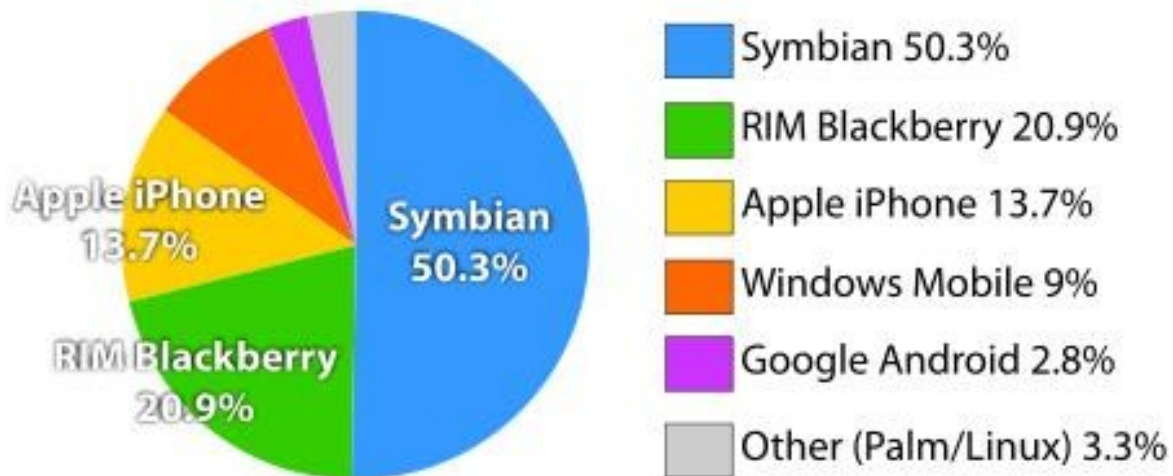
d. Multi-user operating system

It allows two or more users to run programs at the same time. Some OS permit hundreds or even thousands of concurrent users. e.g. UNIX, and Main Frame OS.

The Battle for Market share:

Even though some of the major mobile manufacturers had planned to minimize the monopolistic scenario, it's not getting perfect. Rather tearing down the situation, mobile manufacturers and developers are trying to erect new ones. Android, Nokia, Palm, and RIM are unveiling their own application stores over the net. While the mobile industry is flooded with ideas like comprehensive mobile platform, the consumers prefer a simple but innovative platform. Maybe as needs grow end-users will be gravitated towards a truly open-source platform and they'll expand the sophistication on their own.

Smartphone-OS Marketshare



Picture source: Canalys

According to the UK-based market research and consulting firm, Wireless Expertise, the global sales of smartphones will increase from around 165.2 million in 2009 to 422.96 million in 2013, and escalating the total number of smartphone using community to 1.6 billion. The firm's market research also forecasted that the global market for smartphone applications and games is worth \$4.66 billion in 2009, which will rise to \$16.60 billion, in 2013. Currently, mobiles outnumber the PCs by 4:1, which represents, even bigger chances for mobile industry. In future, Mobile service providers will release APIs which will be addressing fragmentation issues and will grow to create multiple channel application services, retail mobile content with payment module integration. And according to Gartner, apart from the Smartphone OS battle, Windows OS, Linux OS, and Mac OS X are the significant contenders in the ongoing PC OS battle to gain the major market share within the estimated 250 million to 275 million each year. And summing up another 50 million to 70 million servers gives you the Total Available Market (TAM) of OS's every year. And when we consider the potential markets such as the computer markets in underdeveloped and developing countries, could even account for another 200 million PC's per year by 2012.

Gartner Report on Smartphone sales

Worldwide Smartphone Sales to End Users in 2Q09 (Thousands of Units)

Company	2Q09 2Q09 Market		2Q08 2Q08 Market	
	Sales	Share (%)	Sales	Share (%)
Nokia	18,441.0	45.0	15,297.9	47.4
Research In Motion	7,678.9	18.7	5,594.2	17.3
Apple	5,434.7	13.3	892.5	2.8
HTC	2,471.0	6.0	1,330.8	4.1
Fujitsu	1,249.0	3.0	1,071.5	3.3
Others	5,688.2	13.9	8,085.8	25.1
Total	40,962.8	100.0	32,272.7	100.0

Smartphones OS and Open Standards:

The rapid growth and surmounting requirement for advanced mobile communication devices has triggered a mad competition among Communication and Information Technology corporations, like Apple, Blackberry, Palm, Microsoft and Nokia, to captivate the Lion's share of the industry. Surprisingly, Symbian, a London-based software developing company leads the market by about 50%, especially in PDAs and Smartphones. Some other important mobile devices manufacturers like Research In Motion (RIM), Sony, Ericsson and Palm are also playing a vital role in Mobile devices market. On 5th November, 2007, Open-Handset Alliance, a business alliance was established and which was led by Google with 50 members. Most of the significant major global mobile handset makers, mobile application developers, some mobile carriers and chip makers volunteered the alliance. Surprisingly, vital players like Nokia, AT&T and Verizon Wireless were not ready to volunteer the alliance. Android, the flagship mobile platform of the OHA, is a Linux-based platform which has been unveiled on few devices and is getting ready for a wider-launch like its competitors like the Iphone OS, Windows Mobile, Symbian OS, Palm OS, and RIM Blackberry OS.




Usually, Smartphone OS were designed to accommodate third-party applications and tools. Users require more facilities and to do more than making a phone call, play videos and do SMS. The introduction of Web-browsing featured the mini-browsers and more or less, the ongoing OS war will be based on delivering a full-featured online and multimedia environment. Its obvious that, Microsoft turns billions via its PC OS than its Windows Mobile division. The manufacturer who is capable of

providing the better OS for smartphones could be the series market player than the PC Operating system vendors. The reason is a very obvious one, since the chances for smartphone market boom which will transform them to a major medium online and offline specialized business services. And in the other way, one who delivers the best platform, gets a lion's share in the revenue throughout the life of the smartphone market. If we work out the numbers, then its is clear, why this smartphone OS war is so important. From the other point of view, Users consider the smartphones as a pure and easier computing platform. While the computers needed an OS, SDKs, and other third-party ingredients to thrive in the market and smartphones are much easier.

Support for third-party developments:

Recently, AT&T had allowed some VoIP applications to work on the network, which is when installed on iPhone. The VoIP apps were forced by the carriers for the sole reason, that is due to the increase in data cost of the network, yet voice over telephony cannot be charged more. Following that, Verizon wireless has came forward to market their own mobile devices and it is expected to be based on Android, and Google has lit green lights over the usage of its Voice-over application on that device.

Building a one-fits-all platform is a dream, right now. It is difficult using native code while using HTML, Java, and CSS, it might deliver a native look and feel, and obviously will cover all of the top platforms. But when we talk about the enhancements like accelerometer, GPS, and others, it will work only on native applications. And when we want to create native apps, we will have to make a deep study over the choices of end-users, devices, and tools -- exactly, the entire marketing system of the bigger vendors.

	 iPhone	 ANDROID	 BlackBerry	symbian	 Windows Mobile
Pros	<ul style="list-style-type: none"> •Great UI builder & clear design guidelines •OSX based 	<ul style="list-style-type: none"> •Complete J2SE stack •Google provided libraries 	<ul style="list-style-type: none"> •Good backwards compatibility •RIM provided emulators 	<ul style="list-style-type: none"> •Ability to write managed or native code •Resource efficient 	<ul style="list-style-type: none"> •Managed or native code •Windows based •.NET Compact Framework
Cons	<ul style="list-style-type: none"> •No background threads •Ambiguous approval process 	<ul style="list-style-type: none"> •Confusing app lifecycle, data persistence model •Limited docs 	<ul style="list-style-type: none"> •Buggy tools •Only J2ME and few RIM libraries available 	<ul style="list-style-type: none"> •Symbian Signed •Specialized flavor of C++ 	<ul style="list-style-type: none"> •Difficult to make solid UI

Apple iPhone OS:

Apple iPhone's development chain, from the beginning Xcode to the App store, is finely polished again and again. Apple has already started positioning as a major market player and has edge over other competitors. Undoubtedly, Apple has created a PC-grade Operating system for a smartphone. So, Apple iPhone OS is considered by many experts as gold standard for a smartphone OS and which is forcing other smart market players to play down the costs to grab a decent market share.

Of course, Microsoft's Windows mobile edition has the biggest chance to be a vital player. Microsoft's decision to design a mobile OS (Windows Mobile) aimed mostly at immediate business which may be a purely good short-strategy, but it must design an OS like OS X and deliver it to a wider consumer market.

Another strong but less-famous marketer is Palm, and it was reported that Palm is working on a comprehensive OS for smartphones. We can even spot some unusual versions of Linux emerging from various marketers. Apart from Android OS, Google designing a Google-phone on its own, and the main advantages focused in it were said to be a OS tied with Web-based search and other child services.

Google Android

Google's Android is undoubtedly similar to the iPhone OS in almost every way. It has Accelerometer, Application store, OpenGL for graphics, GPS and more utilities similar to iPhone. Even though the first Android phone came with a keyboard, since the keypress events are just like an Apple iPhone.

Surprisingly, there are several differences like, when we talk about graphics and User-Interface, Apple's iPhone could lead with floating point values than Androids. The strongest differences could be in the developing language, since Google choose Java, a well-known language for most of the developers. So the programmers can easily program an application with Eclipse and simulate the application running on the phone in another Java process. The Java-based tools are very cheap and sometimes it comes at no cost and it takes less time to develop an application to up and running.

Symbian OS

Even though the Symbian got the major share of the smartphone market, they were used mostly in lower-end phones with less memory attributes that will not offer a pure web-browsing experience, GPS utilities, OpenGL for graphics, or other handy applications, but luckily it installs and runs Java ME (Micro Edition) applications and plays the puppets in the market at a dramatically lower-price. Symbian struggles sometimes to work with the challenges in developing for a sizably wide range of platform like it.. There are several symbian smartphones that costs several hundreds dollars which shows video at 19fps. The main reason for the victory for Symbain is the easily affordable cost

RIM BlackBerry

RIM BlackBerry knows that the people choose them because they're are hyped as the prestigious option for business players. RIM's market mainly belongs to the enterprise development. Using the BlackBerry widget APIs, developers can, create seamless applications. For instance, the application interaction between a widget and the BlackBerry's Email client applications, delivers ability to view or edit the files and documents on the memory or even it enables location-based services or the media

player, and more at a time. RIM Blackberry developers can take advantages of its uniquepush technology, which enables dynamic widgets to run in the background and which provides some proactive alerts to users in an appropriate manner.

Conclusion

Traditional monolithic mobile operating systems have conceptually remained almost unchanged like its forefather, the UNIX. Several experimental mobile operating systems from the research community have been based on alternative paradigms. The new operational environment needed for a new DNA of a Mobile Operating System is possible when targeted towards robust operating systems that are strong in system integrity, connectivity and enhanced power management. And the days are nearing to witness them.

References:

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- Smartphones estimated figures source: Wireless Expertise

Glossary:

- OS – Operating System
- PC – Personal Computer
- TAM – Total Available Market
- RIM – Research In Motion
- RTOS - Real-Time Operating System
- DNA – Deoxy Nucleic Acid (Not relational to topic)
- VoIP – Voice over Internet Telephony
- PDA – Personal Digital Assitant
- UNIX – A computer operating system