

## Controlling the Android

Protecting mobile operator investment  
in the Android ecosystem.



### Industry briefing

Android has democratized the smartphone experience. Smartphone products and services have become accessible and inclusive for millions of consumers and allowed mobile operators to target new customer segments. But it's also changed the balance of power and quickly cultivated a decentralized ecosystem that many argue has led to fragmentation.

As the Android ecosystem continues to grow, this report looks at the validity of these concerns, what impact platform fragmentation has on end-user profitability and how mobile operators should best leverage their Android investments.



# WDS Industry Briefing

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## Executive Summary

Android's gamble came in the form of openness. It's a gamble that paid off, answering a very real demand in the industry for accessible smartphone products across a variety of price-points.

The platform has since become a highly desirable prospect for the operator community. However, its success is not without its challenges and concerns over fragmentation and total cost of ownership refuse to go away.

Over a 12 month period WDS has tracked how consumers interact with the Android 'ecosystem', including analysis of 600,000 technical support calls, to identify the platform's 'cost-of-ownership' for operators. The findings conclude that many operator systems and processes have not kept pace with Android's growth, adding additional strain to infrastructure and business models. However, the challenges that have arisen are addressable and in no way outweigh the benefits derived from Android's accessibility and openness.

Much of the cost comes not from any inherent failings in the platform itself but from the decentralized ecosystem that the platform is cultivating. For example, deployment by more than 35 OEMs and lower-cost product coming to market is leading to higher than average rates of hardware failures and, in turn, return and repair costs.

Likewise, the interdependency between Google, the OEM and the operator in managing OS updates has changed the relationship between consumer and device forever and has driven notable increases in support volumes (and costs) towards the carrier.

Ultimately, Android has been instrumental in democratizing the smartphone experience; but to continue benefiting operators must further evolve, not only to react and manage the decentralized mobile ecosystem but to manage the requirements of the next billion smartphone users.

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## Android: From zero to hero

Despite the economic stagnation that has hit other parts of the telecoms industry, the mobile handset market remains surprisingly buoyant. Shipment volumes continue to increase year-on-year; from 1.15bn in 2009, and 1.38bn last year to 737m units shipped in the first six months of 2011 alone.

Much of this growth has come from the smartphone device category and in most mature markets smartphones now account for more than half of all new devices sold. This rapid growth, and penetration into a highly price-sensitive mass-market, has largely been fed by the success of the Android operating system. The open-source nature of the Android OS, coupled with maturation across the component market, has allowed smartphone prices to plummet. In some cases, wholesale prices have dropped below USD\$100 per unit, the traditional preserve of the featurephone segment. For operators this becomes a highly desirable prospect, offering the ability to meet consumer demand for smartphone product without carrying the burden of expensive handset subsidies.

However, with smartphones quickly becoming the 'de facto' device choice for consumers, additional consideration must be given to the cost of managing these devices in a network. However attractive the initial price point, it only represents one facet of the Total Cost of Ownership (TCO). This paper looks at how mobile operators can best control Android's unique ecosystem, rapid growth and deployment across a broad range of hardware platforms to mitigate unnecessary cost being driven into their businesses.

It is not this report's intention to evaluate the Android business model or Google's commercial practices. As customer experience experts, WDS has an expert view on how consumers are interacting with the Android ecosystem and where costs are being driven into the mobile operator business. This report uses data from 600,000 technical support calls handled by WDS over a 12 month period (August 2010-July 2011).

For the purposes of this paper, the term 'Android device' refers to smartphone product and not [Android] deployments to tablets.

### Gambling on openness

Although a late entry to the smartphone arena, Android's mass appeal has seen its market share quickly surpass competitors' with industry analyst Gartner predicting a 49% share of the smartphone OS market by 2012, compared to 19% for its closest rival, iOS<sup>1</sup>.

Android answered a very specific and timely need. By 2008, smartphones were starting to capture market share, allowing mobile operators to leverage the billions invested in 3G networks. But the smartphone remained the preserve of the early-adopter; it was expensive to procure and so required heavy subsidies from the operator; it was often expensive to support and in many cases it was simply too complex for the mass-market consumer.

Apple signaled the change with its iPhone, opening up the consumer market, demystifying the smartphone platform and focusing attention not on features, functions and technical competence but on use-cases and apps. However, the iPhone was positioned at the high-end of the market; it was expensive and remained limited to selected partner networks for several years.

Android was the antithesis of this and its gamble came in the form of openness. The operating system, typically a key licensing cost for manufacturers, was (and remains) free for use under an open source license. Likewise, the manufacturer and developer communities were granted free access over the development and acceptance of apps. Its use exploded and today the OS is deployed by more than 35 OEMs<sup>2</sup>, offering an accessible and customizable platform that has resonated with manufacturers and mobile operators alike.

Android allowed operators to compete in the smartphone market in a highly effective manner. Not only is the market for Android smartphones highly competitive, with price points typically half that of the iPhone, but the platform is customizable, allowing operators to tackle the threat that Apple posed in its unwillingness to co-brand with partners.

1 <http://www.gartner.com/it/page.jsp?id=1622614>  
2 <http://www.android.com>

The mobile device 'long-tail'

The mid to high-end of the smartphone market still commands a premium that forces many operators to subsidize devices (the average smartphone subsidy is USD\$200<sup>3</sup>). This immediately impacts subscriber profitability and, as a consequence, low-cost device manufacturers have seen remarkable growth as operators look to source cheaper alternatives.

Device manufacturers such as China's ZTE have clearly benefited from this; gaining significant market share in very little time. The company has openly built a strategy around low-cost devices and is this year the world's fifth largest device manufacturer by shipment volume after Nokia, Samsung, LG and Apple<sup>4</sup>. However, Android has also cultivated a community of smaller, low-run manufacturers, leading to the rise of what WDS describes as the mobile device 'long-tail'.

Since 2009 four of the largest manufacturers have collectively lost 23.6% market share (LG, Motorola, Sony Ericsson and Nokia) and it's the device long-tail that has benefited the most. The long-tail comprises manufacturers typically too small to register on the shipment league-tables compiled by the analyst houses, simply being acknowledged as 'others'. In 2009, these 'others' held 12.3% of all global handset shipments (29.4m units in Q1 2009). Today they control over a quarter (27.86%), (see Fig. 1). That's a 15.7% increase and over 100m units shipped in Q2 this year alone largely thanks to lower component costs, open-source operating systems such as Android and an insatiable consumer appetite for mobile products.

So, Android's influence has been far-reaching. It's re-shaped the device landscape, shifted market-share away from the 'old-guard' and democratized smartphone ownership. But as the platform scales, can mobile operator systems scale with it? How are its unique ecosystem and the availability of low-cost product from the long-tail impacting operator profitability, and is it a sustainable model?

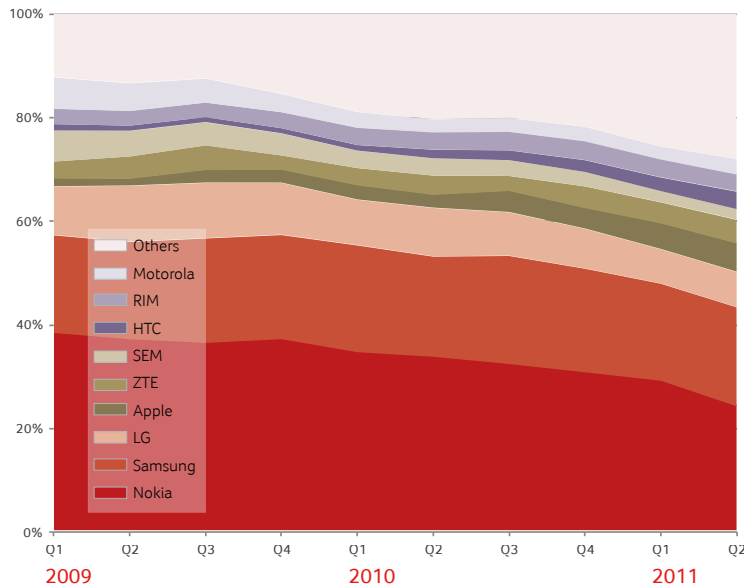


Fig 1. Android has helped to cultivate a mobile device long-tail, collectively responsible for more than a quarter of all device shipments. (source: WDS 2010).

3 Smartphone Profitability Whitepaper (WDS 2010)  
 4 Source: Strategy Analytics (July 2011)

## Is Android really fragmented?

In November 2010, when game developer Rovio Mobile withdrew its hugely popular Angry Birds from the Android Market it made public a very real symptom of platform fragmentation. Games such as Angry Birds have brand value in themselves; they are a draw for consumers, used in mobile operator advertisements and are downloaded in their millions. However, when Rovio Mobile began receiving complaints that the game was running poorly on a number of Android handsets it discovered that some older, and some less-well specified devices were unable to deliver a quality gaming experience<sup>5</sup>. The game was subsequently withdrawn and plans for Angry Birds Lite (coded to the lowest common [Android] denominator) released.

The problem is symptomatic of both hardware and software fragmentation, and made public one very clear problem with an open source platform; the experience on one Android device is not necessarily consistent with the next.

### Hardware Fragmentation

Unlike operating systems from competing vendors, such as Apple and RIM, Android is available under an open source license. Both Apple and RIM operate a tightly controlled, and largely closed, ecosystem. Their OS is deployed only on their hardware, built to their specifications and passed through their own testing processes; consequently the customer experience is predictable and consistent. At the other end of the spectrum sits Android. The OS is deployed by dozens of OEMs, each using different hardware reference designs and each subject to different testing processes.

Android deployments can never compete with the hardware consistency (or software integration) of some of its competitors; nor does it want to. Google executives have repeatedly argued against clamping down on fragmentation, claiming that the company does not believe in a 'one size fits all' solution<sup>6</sup>. However, contrary to popular belief Google does impose certain anti-fragmentation measures. For example, to deploy the Android Market manufacturers must follow the Android Compatibility Program<sup>7</sup>, which includes a Compatibility Testing Suite (CTS) on which to test deployments against the Compatibility Definition Document (CDD). In addition to describing compatibility, standards and customization rights over the software it also mandates a minimum set of hardware requirements, covering for example the screen and camera, so that Android Market apps are able to permeate across the widest Android device community possible.

However, to broaden its reach to as many manufacturers, and budgets as possible, minimum processor / graphics processor speeds (one of the largest single component costs in an Android build) are low; certainly lower than the 1Ghz processor speed mandated by Microsoft for all Windows Phone 7 builds. This is the problem that Rovio Mobile ran into; many older devices and low-end entry level devices simply didn't have the processing power to deliver a quality experience. It's also a problem that many smartphone consumers experience, many of who subsequently add cost to their mobile operator by contacting customer care looking for a resolution, or worse, looking for a replacement.

### Consistency and buyer's remorse

At the point-of-sale many consumers (and retailers alike) are assuming a degree of consistency across Android devices that in some cases doesn't exist. Even migrating from one Android device to the next can bring about problems as consumers' expectations for performance are dismantled by a different hardware build and by potentially resource-hungry operator and manufacturer overlays.

Indeed, because Android Market displays only apps capable of running on a specific build, a number of operators and retailers have experienced product returns from consumers unable to access the same content as their friends, or the same content and apps as their previous device.

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5 Source: Rovio Mobile Blog Nov 2010  
6 <http://android-developers.blogspot.com/2011/04/i-think-im-having-gene-amdahl-moment.html>  
7 <http://source.android.com/compatibility/index.html>

The problem can also be compounded by the length of time a device sits in the dealer channel waiting to be sold. What, to the consumer, might appear as the latest device may in fact be shipping with a 12 month old single-core processor and an old OS version. Only when the consumer returns home and un-boxes his new purchase does he realize that he is unable to achieve the same Android experience as his peers (or his previous device).

As a majority, consumers don't (and shouldn't) care about platform fragmentation and OS versions. As part of the buying cycle, consumers will have built an opinion about a product. Expectations are set and when they are not fulfilled, perhaps as in the case above, the consumer may experience buyers' remorse – the feeling that the product doesn't offer the best value for money or that a more preferable product was available elsewhere.

**From Donuts to Cupcakes**

It's not only [the lack of] hardware consistency that causes difficulties for developers and inconsistencies for consumers. Many argue that there are simply too many versions of the Android Operating System in circulation and that this again drives additional support costs from consumers; a) looking to upgrade and checking with their operator for release dates, b) finding that after an upgrade they have lost previously available functionality and c) finding that their device won't get, or isn't capable of getting, the latest upgrade.

Information regarding upgrade availability often differs between manufactures and achieving OS version parity across a base of devices can take several months. This, and a combination of frequent OS upgrades and the duration of time that stock sits in the channel means that it's common for a consumer's newly acquired device to already be running an outdated version of Android. In an October 2011 study of 18 Android devices from the US, 10 were at least two major versions behind within their two-year contract period<sup>8</sup>.

Like the hardware fragmentation issue, this can cause problems. The Android Market allows application developers to build for specific Android versions meaning consumers could discover that

their new device (with legacy OS version) doesn't have the necessary software APIs to access some apps. For example, resource intensive applications built to leverage the performance improvements of Android 2.2 (Froyo) will not perform well on older versions of the OS.

Last year Netflix, a provider of on-demand streamed movies, ran into problems when developing its Android app. The service was already available on more than 200 different consumer electronics devices, including iOS and Windows Phone 7. However the company pulled the launch of an Android app, stating that Android fragmentation had led to the lack of a common digital rights management (DRM) solution<sup>9</sup>.

This was a key requirement enforced upon it by its major studio partners. To circumvent the problem, Netflix was forced to work with individual device manufacturers to add content protection to their devices.

Version	Code Name	Release Date
1.0	n/a	23 Sept 2008
1.1	n/a	9 Feb 2009
1.5	Cupcake	30 April 2009
1.6	Donut	15 Sept 2009
2.0	Eclair	26 Oct 2009
2.0.1	(feature release)	3 Dec 2009
2.1	(feature release)	12 Jan 2010
2.2	Froyo	20 May 2010
2.3	Gingerbread	6 Dec 2010
2.3.3	(feature release)	n/a
2.3.4	(feature release)	n/a
2.3.5	(feature release)	25 Jul 2011
2.3.6	(feature release)	n/a
2.3.7	(feature release)	n/a
3.0	Honeycomb	22 Feb 2011
3.1	(feature release)	10 May 2011
3.2	(feature release)	15 July 2011
4.0	Ice Cream Sandwich	19 Oct 2011

Fig 2. Android version history

8 <http://theunderstatement.com/> (Oct 2011)

9 Source: ZDNet, Nov 2010 <http://zd.net/df4nO7>

*“Unfortunately, this is a much slower approach and leads to a fragmented experience on Android, in which some handsets will have access to Netflix and others won’t,” explained Netflix. “This clearly is not the preferred solution, and we regret the confusion it might create for consumers. However, we believe that providing the service for some Android device owners is better than denying it to everyone.”<sup>10</sup>*

The situation is improving. Google’s own data<sup>11</sup> shows that over 90% of Android devices are now running v2.x, as a minimum. WDS analysis (Fig.3) shows that a new Android version requires 2-3 months in-market before accelerating in market share, and then peaks at 50-60% share before declining to make way for its successor.

In the wider context of Android’s rampant growth, such issues may seem trivial, but they are indicative of the wider set of challenges being faced not only by those creating the apps and devices, but for those using them and supporting them.

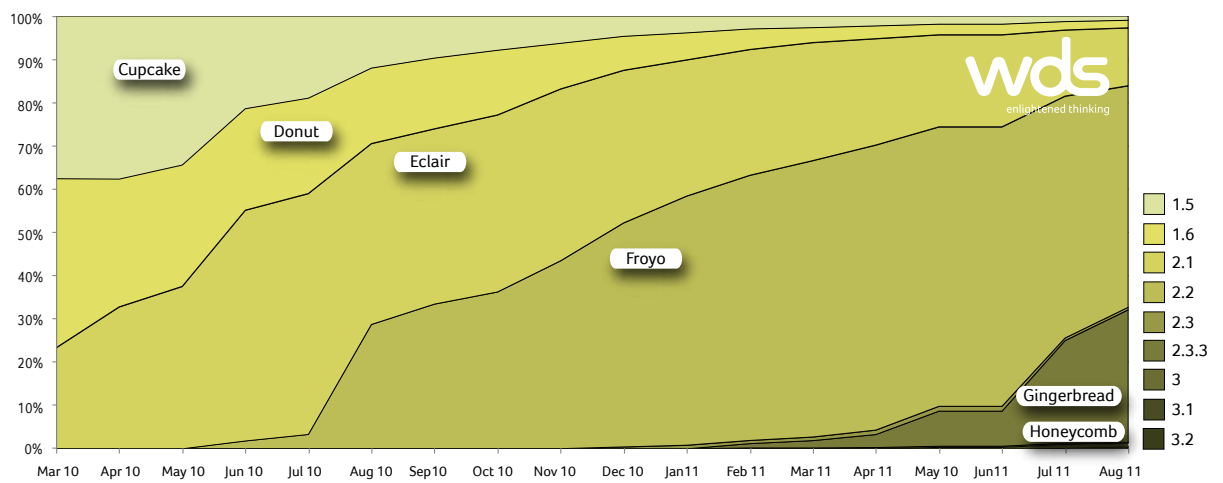


Fig 3. Android version market share (March 2010-August 2011). (source: compiled by WDS from multiple sources 2011).

<sup>10</sup> <http://blog.netflix.com/2010/11/netflix-on-android.html>

<sup>11</sup> <http://developer.android.com/resources/dashboard/platform-versions.html>



## Supporting Android

As customer experience experts WDS has a unique perspective and understanding of how consumers interact with the Android ecosystem and the impact that this has on operator profitability and consumer loyalty.

### Introducing smartphone Total Cost of Ownership

Direct support costs are those that cover the correction of faults experienced by a deployed product or service. Such costs are typically higher across the smartphone category when compared to feature phones. WDS research has shown that this problem is not unique to Android but impacts the smartphone category as a whole.

There are three variables that impact cost-to-support.

1. Increased Average Handle Time: Technical support calls across the smartphone sector are typically longer in duration than equivalent feature phones. This is symptomatic of product and service complexity extending a support agent's diagnosis and resolution times. The duration of calls is expressed as Average Handle Time (AHT). AHT is negatively impacted by the multiple variables that need to be considered by the support agent; for example multiple network bearers, instances of third party software and malware must all be considered on the smartphone platform.

2. Escalation and the Threat of No Fault Found: The complex nature of the smartphone support environment will, in the short to medium term, require a greater degree of support escalation up to more expensive technical support resources. The temptation for many operators is to dissuade cheaper tier one support resource from escalating calls up to more expensive support resources as a means of managing cost. However, this comes at a risk to long term profitability and consumer loyalty. In particular, the threat of misdiagnosis by an inexperienced CSR can lead to an unnecessary product return. This is known as a No Fault Found (NFF) return.

3. Propensity to Call: Responding to commercial pressures to reduce their development and time-to-market cycles, the industry has become over-reliant on deploy-now, fix-later methodologies that see buggy devices launched to market with the intent of delivering over-the-air fixes at a later date. In other cases, bugs are missed during the Quality Assurance phase altogether. Both practices can drive PTC (Propensity to Call) rates. Propensity to Call measures the instances of a device 'presenting' itself at a technical Tier 3 support channel during its lifetime within the network. PTC is influenced by a device's complexity, reliability and usability, perhaps caused by a firmware defect, a poorly designed product or simply a lack of testing. The figure can be calculated by comparing support volumes generated by a product against the relative shipment volumes for the same period. For example, a shipment of 10,000 units generating support calls from 500 devices would have a PTC of 5%. The normal range for PTC is between 5-15% of a batch. Anything above this figure would suggest a deficiency in the customer experience, possibly caused by a firmware defect.

### Are Android devices more expensive to support?

Measured by AHT Android devices are no easier, nor more difficult, to troubleshoot than a comparative product from an alternate OS vendor. However, analysis of problem types encountered by different OS brands can often point to key deficiencies in the OS value chain that can drive PTC and NFF rates.

### Hardware faults on Android deployments

An example is a higher than average propensity for hardware failures on the Android platform. This is indicative of the hardware fragmentation and low-cost hardware reference designs as described earlier in this paper.

Of the smartphone technical support calls analyzed by WDS 14% of Android calls were assigned to hardware faults such as button or touchscreen failures, speaker and microphone faults and battery performance. Windows Phone 7 OS operates within a similar set of dynamics to Android in that it is implemented by multiple manufacturers.

However, Windows Phone 7 deployments are subject to tighter minimum hardware specifications and, by comparison, 11% of technical support calls for the platform were assigned to hardware. At the other end of the scale iOS and the BlackBerry OS are both implemented on closed hardware platforms tightly controlled by Apple and RIM. This full, end-to-end control is reflected in a far lower propensity for hardware failure; 7% and 6% respectively (Fig.4).

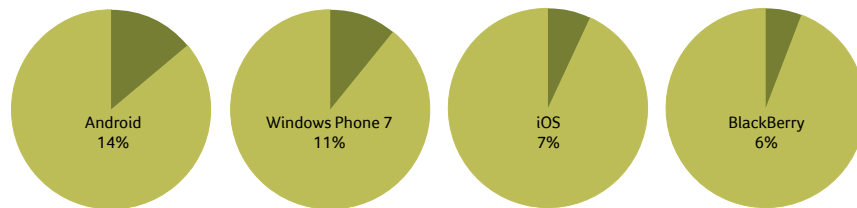


Fig 4. Hardware related calls as a percentage of all technical support calls. (source: WDS 2011).

#### The impact of hardware faults on product returns

Hardware faults are of particular concern to mobile operators. Software or configuration faults can typically be rectified by the CSR remotely, either through manual configuration or an over-the-air update. However, hardware faults (if within a warranty period) usually result in the device being returned and entered into a reverse logistics process for repair or replacement. This results in additional cost for the operator:

- Logistics: Authorizing returns, testing, repairing, restocking, reshipping and disposal.
- Sales & Marketing: Remarketing / selling refurbished products.
- Finance: Validating warranty repairs and recovering costs from suppliers.
- Customer Service: Managing customer interactions.

The ability of an operator to reclaim the initial value of a returned device is critical. While there is no set model in the industry for returns (there are many factors that determine who in the supply chain pays for returns, repairs, restocking and transportation for example), the normal range for recoverable value can vary anywhere between 20-70%, resulting in a cost of approximately £80 per return for the operator. The necessity to mitigate high rates of returns is therefore imperative. Across most consumer goods, rates of return average 5-12%. The mobile industry is no different and WDS estimates the average rate of smartphone returns at 5-10%. This means that Android device returns could be costing operators up to US\$2bn a year.

## Hardware faults

While Android deployments may show a higher propensity to hardware failures than rival OS platforms, analysis of these hardware faults shows no principle defects on the platform; ie: the platform is not predisposed to one particular hardware defect. Instead, the distribution of hardware faults against weighted averages deviates by less than 1% in all categories. In this instance, Android actually benefits from deployment across multiple reference designs and component variants. This means that the brand is unlikely to be associated with a specific hardware shortcoming.

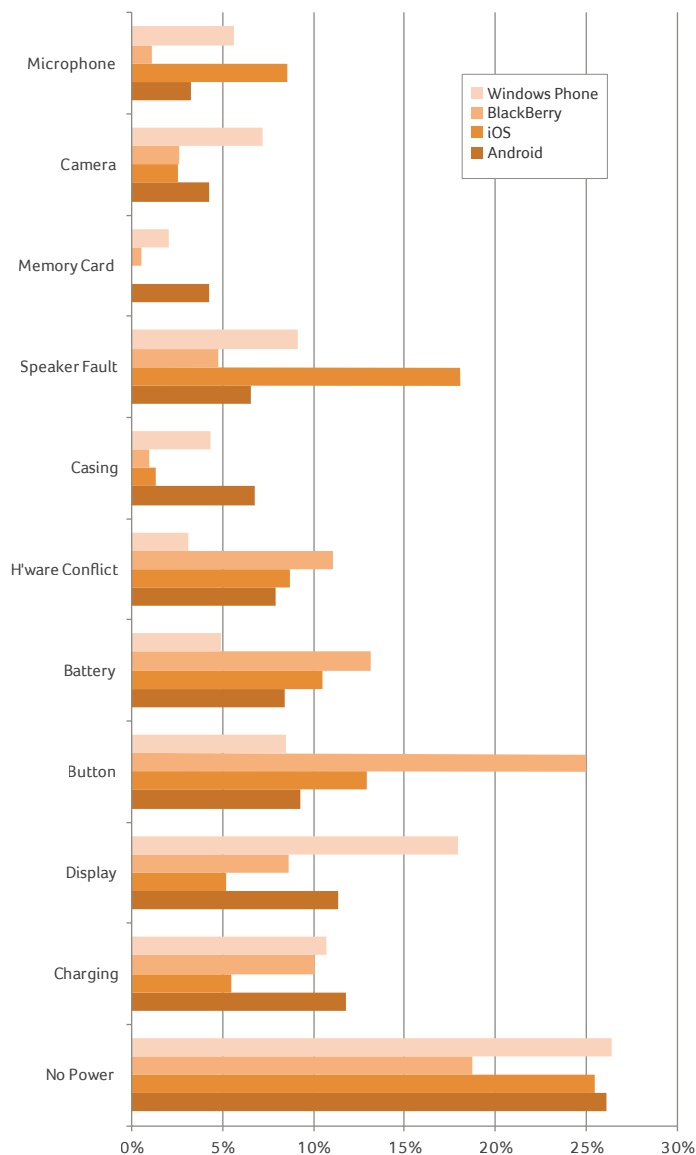


Fig 6. Hardware fault types by OS. (source: WDS 2011).

Conversely, both iOS and BlackBerry (deployed on controlled hardware designs with limited component deviation) show strong weighting towards failures in particular hardware categories (Fig.6). This is the result of a single defect permeating across an entire device portfolio. In Apple's case, 16% of all hardware issues relate to speaker failure (against a weighted average of 6%). For BlackBerry, a quarter of all faults resided with Button / Key failure (against an 8.8% average).

It's important to consider these figures in the wider context of total calls received. For example, while 16% of all Apple hardware failures related to speaker faults, such calls represent just 1.3% of all technical support calls taken for the platform. However it remains an important metric as brands can quickly become associated with a particular hardware deficiency if their distribution of hardware failures is focused too heavily in

a particular category. For example, BlackBerry's reputation for battery longevity, build and audio quality is upheld in these finding. Likewise, Apple's reputation for quality displays but occasionally sub-optimal audio performance is also qualified by these results (Fig 7).

Hardware Fault	Best in Class	Worst in Class
No Power	BlackBerry	Windows Phone
Charger / Charging Fault	iOS	Android
Display Damage	iOS	Windows Phone
Keypad / Button Failure	Android	BlackBerry
Battery Fault	Windows Phone	BlackBerry
Hardware Conflict	Windows Phone	BlackBerry
Casing Damage	BlackBerry	Android
Speaker Fault	BlackBerry	iOS
Memory Card Slot Fault *	BlackBerry	Android
Camera Fault	iOS	Windows Phone
Microphone Fault	BlackBerry	iOS

Fig 7. Hardware fault best in class vs worst in class. (source: WDS 2011).

When hardware failures do occur, operators must take care to protect their consumers against potentially unbalanced and negative attention. Loyal consumers are both an asset to a brand and a threat to its competitors through the display of 'oppositional loyalty'. This is the term used to describe the expression of unfavorable bias toward an opposing brand and its consumers (for example, Apple vs Android 'fanboys'). The smartphone category has become a hypercompetitive environment and the prevalence of brand rivalry both within the industry and amongst consumers has formed a promising hook for media attention. Where an underlying theme of hardware failures can be linked to a specified brand, rival brands and consumer groups very quickly leverage this opportunity to launch an attack.

Following the release of the iPhone 4 reports began to emerge of an alleged hardware fault with the phone's antenna<sup>12</sup>. Although only 0.55% of consumers calling in this issue to Apple Care<sup>13</sup>, the story received an unprecedented amount of media attention provoking an urgent PR challenge. Despite a relatively insignificant proportion of devices affected, the barrage of negative press posed an irrefutable threat to the overall perception of the quality delivered by the Apple, brand forcing the then CEO, Steve Jobs to take the spotlight in defense of Apple and the iPhone 4.

12 <http://support.apple.com/kb/HT4389>

13 Apple press conference (July 16 2010)

## Software faults

Support costs are not limited to hardware failures. In fact hardware problems account for 14% of all support calls taken compared to nearly 16% for platform / software issues. Android generates a far higher number of such calls (as a percentage of all support calls taken) than many of its competitors. Both BlackBerry and iOS generate relatively few calls regarding software with only 4% and 2% respectively.

However this is not an indictment of the platform's shortcomings, rather a testament to its growth across a broader range of consumers than many of the other smartphone platforms. For many consumers an Android device will be their first smartphone. The migration from a featurephone to a smartphone can occasionally be intimidating; with advanced features and functions to navigate and learn. Many of the platform / software calls included in this study were symptomatic of this migratory period into the mass-market and can be classed as user-education.

However, analysis does show a correlation between support traffic and Android OS updates. Earlier in this paper we discussed how many players in the Android ecosystem were being challenged by software fragmentation in the drive to keep pace with rapid OS updates. There is much anecdotal evidence to suggest updates cause many end-users to experience unexpected device behavior or loss of previously available functionality. However, it must not be assumed that shortcomings are the direct result of Android tweaks. Instead, a number of faults have arisen because of the functionality added (or removed) by operators and OEMs in their overlays. In one example from 2010, a UK operator was forced to apologize to its customers after fielding a storm of complaints from users unhappy with the addition of 'bloatware' – unnecessary software added by the operator that couldn't easily be removed, in an Android 2.1 update. Customers complained that the additions slowed their devices and inhibited some functionality (including SMS notifications).

Unfortunately it is difficult to directly correlate all hardware and software faults with OS updates because of the extended period of time that the updates take place over and because a fault may not necessarily be logged by a CSR as a result of an OS update. However, WDS analysis has been able to point to an increased support burden in the weeks preceding and following specific updates.

For one smartphone manufacturer included in the WDS survey, issues that were root-caused back to an OS update increased by nearly 400% in the month following a Gingerbread release. Support traffic peaked for eight weeks before returning to normal levels. (See Fig .8).

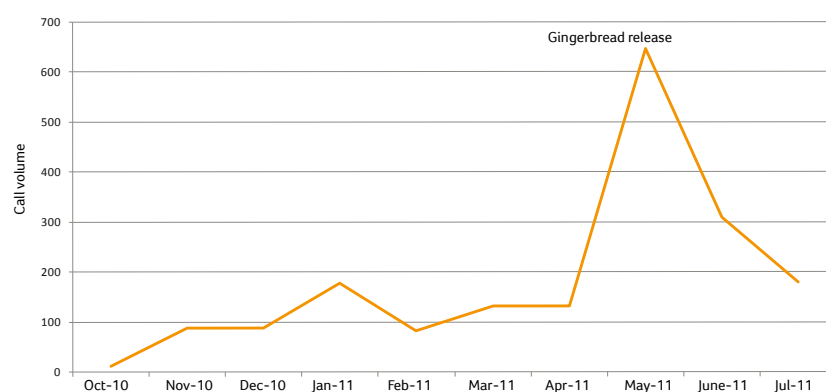


Fig 8. Support volume spike at time of an OS update. (source: WDS 2011).

Any OS vendor releasing updates is susceptible to such problems, however given their tighter hardware ecosystems it seems that both Apple and RIM suffer less. At the time of writing not enough information regarding the Windows Phone Mango update was available for comparison.

However Microsoft has historically suffered in the distribution of patches. In March 2011, the company began releasing its NoDu patch to add cut and paste (and more) functionality to devices. A number of consumers were subsequently presented with error codes<sup>14</sup>.

14 <http://tnw.co/e7DOAP>

This occurred when the target device was running low on clear storage. However, the error code (800705B4) offered no description of the problem or a resolution, forcing many consumers to contact technical support.

The Windows Phone (NoDu) example above was largely limited to a single smartphone manufacturer and hardware build, further indicating the frustrations of an open eco-system where operator, OS vendor, and hardware manufacturer exist and operate independently. For the operator, this has become a challenging environment. As the principle billing point, most consumers default to their operator for support and it is usually they, (not the OEM or OS vendor) who foot a large part of the support bill when things go wrong. In the case of devices bricked by the NoDu update, Microsoft's direct response to consumers (through the official @WinPhoneSupport twitter channel) was to exchange it. Most likely, such consumer advice came at the surprise of operators whose first indication that something was wrong would have been a spike in support traffic and an overnight mountain of returned devices.

While these operators will have been able to recover much of the returns bill from their OEM partner, we have already seen how any jump in returns has direct impact on profitability with operators being exposed to reverse logistics and customer support costs. In addition, it is unlikely that stock would have been sufficient to provide a timely replacement to each and every customer who decided to return their device. In such scenarios the operator's brand is at immediate risk, and consequently so is the loyalty of its customers.

#### Do consumers care about OS updates?

Not all support introductions relating to OS updates are attributable to problems. In fact, operators are increasingly seeing instances of consumers contacting them to ask when an update will be available to them.

The idea of a consumer proactively seeking to update his mobile device firmware would have seemed almost alien just a few years ago. Today, the rapid development of Android versions means a new generation of consumers now receptive to adding features and functions to their device through the Android updating process. 6% of all platform / software calls in the WDS survey related to consumers simply wanting to know when an update would be made available. No other platform comes close to this (Windows Phone 1.5%, BlackBerry 0.5%, iOS 1%).

But while this may suggest a degree of excitement among the Android community for updates, it may also point to the fragmentation of the Android Updating Process, because when it comes to Android devices, not all are created equally. In many cases, devices aren't eligible for version updates and OEMs often limit availability. Many early Android devices missed Froyo (2.2) on the basis of hardware performance being too limited to provide full support. In other cases, where OEM and operator overlays are made to Android, OEMs and operators may delay the launch of version updates while personalization takes place. Overlays add significant time to launch cycles, causing inbound requests from consumers requesting a version widely publicized as being launched and available by Google.

## Summary

The speed of Android's penetration into the market has undoubtedly put strain on operators' supporting infrastructures and business models. However, the challenges that have arisen are addressable and in no way outweigh the benefits derived from Android's accessibility and openness.

Despite objections to the contrary [from Google], it is our belief that platform fragmentation has driven additional cost into many operators' businesses, either through support costs or product returns. WDS believes the difference in opinion comes from a disconnect between operator and retailer support channels and Google itself. The industry's own decentralization and fragmentation means that data rarely flows seamlessly across all parties involved in the development, manufacture, distribution, retail and servicing of a product.

Of course, the only way to truly combat both hardware and software version fragmentation would be to slow down the pace of development and/or mandate tighter deployment requirements. However, this would be detrimental to Android's USP and, ultimately, its competitiveness. In the case of software fragmentation this leaves Google to perform a careful balancing act; juggling the need to develop the platform at a pace that protects its market leadership but with consideration for the external factors that impact the customer experience and TCO for its principle channel to market, the operators.

However, this decentralization does cause confusion for consumers with uncertainty as to who to call if things go wrong. Google's reliance on operator and manufacturer partners to manage version roll-outs offers one such example. There is often no clear path for version migration and in many cases it is impossible for a consumer to know when and if their device will qualify for a forthcoming upgrade. This, like many other factors, can cause confusion.

Through its Compatibility Program, Google has found ways to minimize fragmentation and maintain steady growth and adoption of the platform. But while the advantages of Android to operators' smartphone strategies ultimately outweighs the cost of fragmentation, there are recommendations that should be considered to improve the profitability of devices (and subscribers) on the network.

For example, decisions made at the point of sale can have an immediate bearing on the rate of return; mitigating devices returned as being inappropriate or too complex for the consumer. Points-of-sale can often be fault-points in the customer experience. Consumers who purchase a handset that's not appropriate to their needs are at a higher risk of returning devices, contacting expensive support resources or simply defaulting back to more comfortable, and lower-margin, services. The point-of-sale is a key interaction point between the consumer and service provider. Get it wrong and at best a poor customer experience will add cost to the operators' existing support channel, further damaging the profitability of subscribers (which has already been weakened by extensive handset subsidies). At worst, smartphones won't meet consumers' expectations for service and quality, resulting in a poor user experience and damaging loyalty.

Android does not deliver the continuity of customer experience offered by other platforms. As such, Android devices must be retailed and matched to consumer needs based on the merit of individual builds. Likewise, many operators rely on product matching and selling techniques comprising very generic scenarios and consumer types (ie: the teenager who wants access to their social media, the busy mom who needs to organize her day). These are insufficient in today's device marketplace and do not show enough consideration for a wealth of secondary factors; including understanding which smartphone platform the consumer is migrating from, their app requirements etc.

WDS recommends that operators drive more value from the customers by developing more advanced customer segmentation strategies to address these secondary factors. Some of these considerations; what drives an Android purchase and where value can be built, are covered in Fig 9.

	Drivers for purchase	What will the segment value?
Featurephone Upgrader	<ul style="list-style-type: none"> <li>Scheduled upgrade</li> <li>Vanity / Feature upgrade.</li> <li>Improved plan.</li> </ul>	<ul style="list-style-type: none"> <li>Ease of migration.</li> <li>Ease of entry into a smart-phone.</li> <li>Feature education.</li> <li>Contact migration.</li> <li>Competitive plan.</li> </ul>
Other OS to Android	<ul style="list-style-type: none"> <li>Scheduled upgrade</li> <li>Improved plan.</li> <li>Does not like existing platform.</li> <li>Replacement</li> </ul>	<ul style="list-style-type: none"> <li>OS education</li> <li>Ease of migration.</li> <li>Ease of platform migration (app matching).</li> <li>Competitive plan.</li> <li>Contact migration</li> </ul>
Android to Android	<ul style="list-style-type: none"> <li>Does not like existing hardware</li> <li>Scheduled upgrade.</li> <li>Improved plan.</li> <li>Replacement.</li> </ul>	<ul style="list-style-type: none"> <li>OS education (version)</li> <li>Feature comparison</li> <li>Ease of platform migration (app matching).</li> <li>Competitive plan.</li> </ul>

Fig 9. Customer segmentation by previous device (source: WDS 2011).

Once attached to a network, analysis shows that there is no great disparity in the time taken to resolve customer problems on the Android platform than any other smartphone platform. Ultimately, Android devices are no easier, nor more difficult, to troubleshoot than a comparative product from an alternate OS vendor. However, there are areas unique to Android that offer potential for an improved ownership experience. One of these areas is the update process, with consumers often unsure when and if their device will be eligible for an update.

WDS analysis also shows that operator / manufacturer support traffic can spike for eight weeks after an update as consumers look for education regarding the update process or overcome problems with new [or lost] functionality.

Operators may also want to implement improved device testing and on-boarding processes when ranging Android products. Because of its open ecosystem and hardware fragmentation, Android deployments do show a higher propensity for hardware failures than competing platforms. These can be expensive to manage, often resulting in the handset being entered into the repairs / returns process and adding additional reverse logistics costs for the operator. The propensity for a hardware failure must be better understood pre-launch to ensure key support channels are populated with accurate support documentation and returns procedures.

Android has arguably done more than any other technology to develop and democratize the smartphone market. Its growth will continue but will always be hindered by the disconnect that exists between Google, manufacturers and the operator. Mobile operator infrastructures are in need of evolution not only to react and manage this disconnect but to manage the requirements of the next billion smartphone users.

To understand how to overcome these challenges, and maximize your Android investments, please contact [info@wds.co](mailto:info@wds.co) or visit [www.wds.co](http://www.wds.co)





**Methodology:**

Analysis has been drawn from data comprising 600,000 technical support calls, running July 2010-August 2011. Data is global but weighted towards US and Europe (together accounting for 70% of all calls). Calls relate to both carrier and OEM support lines.

Technical support calls are a sub-set of all customer service / care calls serviced by a carrier or OEM and typically represent ~20% of all customer interactions.

This report has not been commissioned nor funded by a commercial party.

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