

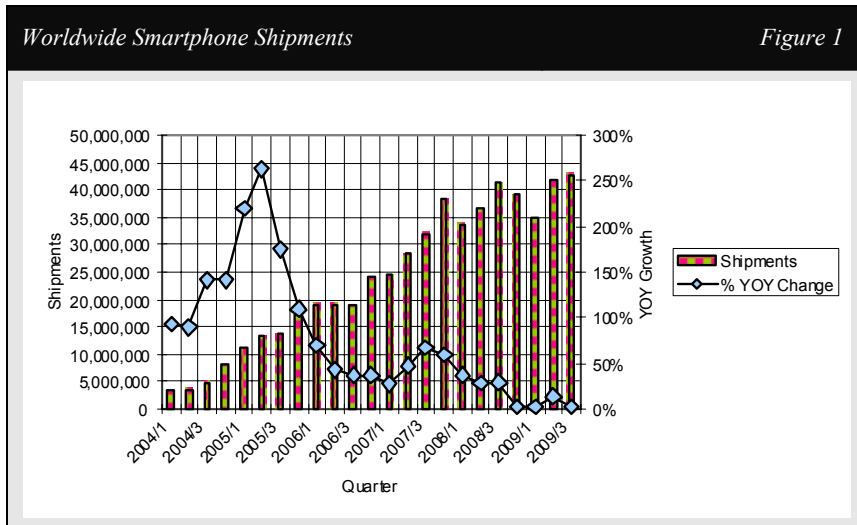
Wolf Bytes 41.23

Google's Android Takes Center Stage

- Smartphone shipments into the wireless carrier channel increased just 3.2% in the September quarter compared to a 14.2% increase in June. Tepid growth of the smartphone market over the past four quarters calls into question forecasts of solid double-digit growth for several years.
- On the strength of endorsements from most of the major smartphone manufacturers, Google's Android took center stage this fall. The open source feature of Android, which allows developers, smartphone manufacturers and carriers to modify the operating system, sounds good in theory. But its implementation could splinter the platform and impede software application development.
- The iPhone remains the gold standard of the smartphone market, and it's likely to remain so for the foreseeable future. No competitive smartphone has emerged as an iPhone killer just as no portable music player came close to becoming an iPod killer. That's because no one develops user-friendly software like Apple does.
- BlackBerry was the big winner in September. BlackBerry shipments increased 40.5% while its market share increased to 19.8% from 14.5% a year ago. The major loser was Windows Mobile, whose share fell to 9.6% from 13.4% a year ago on a 25.6% decline in shipments.

Smartphone Shipment Growth Slows in the September Quarter

Smartphone shipments into the carrier channel, as measured by IDC, increased a disappointing 3.2% in September. After growing at solid double-digit rates for several years, as shown in Figure 1, four-quarter trailing shipments rose just 5.6%.¹ Admittedly, the weak economic climate contributed to the tepid performance in September. But it does call into question the ebullient smartphone growth forecasts of a number of market research firms.



Source: IDC.

For example, the Ovum Group is forecasting that worldwide smartphone shipments will grow at a 21% annual rate to 473 million units in 2014. iSuppli is forecasting 325 million shipments in 2011, equivalent to a 29% growth rate, while Jupiter Research is forecasting 300 million units in 2013, equivalent to a 15% annual growth rate. Our forecast is more subdued. We're predicting that smartphone shipments will reach 428 million units in 2018, equivalent to a 10% compounded annual growth rate. In contrast to the personal computer market, where the major growth is occurring in the emerging regions along with the home market, growth in the smartphone market has been concentrated in the developed regions, particularly the U.S., as shown in Figure 2.

Geographic Distribution of Smartphone Sales *Figure 2*

	2007/1	2007/2	2007/3	2007/4	2007	2008/1	2008/2	2008/3	2008/4	2008	2009/1	2009/2	2009/3
US	2,888,117	3,863,014	5,435,669	7,907,648	20,094,448	6,717,573	7,341,600	10,346,223	9,548,365	33,953,761	9,367,349	10,817,967	12,532,119
% share	11.7%	13.5%	16.9%	20.6%	16.2%	19.8%	20.0%	24.9%	24.3%	22.4%	26.8%	25.8%	29.2%
Western Europe	4,525,988	5,647,044	5,690,508	7,211,453	23,074,993	6,415,034	7,069,253	9,077,045	9,439,611	32,000,943	7,661,767	8,774,276	8,919,742
% share	18.4%	19.8%	17.7%	18.8%	18.7%	18.9%	19.3%	21.8%	24.1%	21.1%	22.0%	20.9%	20.8%
Asia/Pacific	6,682,385	6,988,194	8,258,307	8,714,191	30,643,077	7,072,603	7,235,701	8,011,987	7,176,795	29,497,086	7,838,493	9,137,463	10,169,627
% share	27.1%	24.5%	25.7%	22.7%	24.8%	20.9%	19.7%	19.3%	18.3%	19.5%	22.5%	21.8%	23.7%
Japan	6,170,000	7,095,000	5,510,000	5,615,000	24,390,000	6,187,000	6,426,000	4,181,000	4,220,000	21,014,000	3,979,000	5,712,000	3,537,000
% share	25.0%	24.9%	17.1%	14.6%	19.7%	18.3%	17.5%	10.1%	10.8%	13.9%	11.4%	13.6%	8.2%
EMEA	3,892,574	4,133,129	5,799,148	6,569,060	20,393,911	5,159,036	5,703,590	6,383,994	5,394,623	22,641,243	4,151,719	5,124,273	5,100,918
% share	15.8%	14.5%	18.0%	17.1%	16.5%	15.2%	15.5%	15.4%	13.7%	15.0%	11.9%	12.2%	11.9%
Latin America	234,830	523,614	1,100,663	1,933,647	3,792,754	1,951,454	2,393,618	2,757,695	2,485,605	9,588,372	1,343,590	1,581,615	1,784,906
% share	1.0%	1.8%	3.4%	5.0%	3.1%	5.8%	6.5%	6.6%	6.3%	6.3%	3.9%	3.8%	4.2%
Canada	238,400	274,600	360,000	430,650	1,303,650	393,920	510,000	829,230	976,945	2,710,095	546,630	735,488	887,276
Total	24,632,294	28,524,595	32,154,295	38,381,649	123,692,833	33,896,620	36,679,262	41,587,174	39,241,944	151,405,500	34,888,548	41,883,082	42,931,588

Source: IDC.

¹ Gartner, a market research firm, which measures sales out of rather than into the carrier channel, reported a materially higher growth rate of 13% in the September quarter.

Considerations in the Smartphone Purchase Decision

A variety of considerations influence a customer's choice of a smartphone. Arguably, the most important one is the user interface. Intuitive ease-of-use has proven to be the number one consideration in a number of surveys. The phone's battery life is another. Obviously, users would like their phones to work at least a day between charges. While important, battery life is a moving target because the smartphone manufacturers leapfrog one another from one model to the next.

The carrier network that the phone runs on is also important, although it appears to be more important in the U.S., where Verizon is considered the best by a long shot, than in other countries. Along with the carrier, the cost of carrier subscription plans also influences a consumer's choice. However, the carriers have largely negated the importance of this variable by colluding on price and confusing the issue further through a superficial layer of pricing complexity.

The applications that run on the phone are a fourth consideration, which was thrust to the fore by the stunning success of the iPhone in building a 100,000-application library in a year and a half. The fact that more than 2 billion iPhone applications have been downloaded attests to the importance of this factor in consumers' smartphone choices.

Of course, there are other features of a smartphone that influence purchase decisions. These include the type of keyboard—physical vs. virtual—the resolution of the screen, whether or not the phone has multi-touch capabilities as well as others. But according to the various surveys, these features appear to be generally less important in the choice of a smartphone than those mentioned above.

Android May Be Less than It Seems

Google's Android smartphone operating system was announced two years ago. But it did not reach center stage until this fall when Verizon, to great fanfare, introduced the Motorola Droid and the HTC Droid Eris, both running on Android. Indeed, on the prospect that most of the major smartphone vendors planned to introduce Android phones, Gartner (a market research firm) recently predicted that the Android platform would climb to the number two spot in the smartphone market by 2013, passing both BlackBerry and the iPhone, which it currently trails.

In considering the prospects of Android, it's useful to frame the discussion in terms of the factors that influence a customer's choice of a smartphone. In our opinion, the two variables that are likely to determine the success of Android are its user interface and the depth and breadth of the library of applications running on the phone. Android phones will run on all major networks in the U.S. and abroad, eliminating the network as an issue in the success of the operating system. And Android phones will come with physical as well as virtual keyboards, eliminating this consideration as well.

The Android user interface has been consistently praised chiefly for the suite of Google applications that are bundled with the phones. Walt Mossberg of The Wall Street Journal had high praise for the Google applications running on Android, most notably Google Maps Navigation, a turn-by-turn voice-prompted navigation program. Mossberg writes, "Android still isn't as slick or fluid as the iPhone's OS, in my view, but it has some functionality Apple omits, including the ability to run multiple third-party apps simultaneously."² Mossberg also had high praise for the screen, but noted that the Droid lacked multi-touch features, such as two-finger

² The iPhone in fact has this capability, but Apple has chosen not to activate it except for its own internally developed applications because they act as a drain on battery life.

zooming, which are found on the iPhone and Palm Pre.³ In sum, Mossberg and other reviewers placed the Droid in the top spot of smartphones running on the Verizon network.

The great appeal and promise of Android is that it's an open source operating system in the tradition of the Linux operating system. The appeal of open source lies in the freedom of software developers, smartphone manufacturers and wireless carriers to modify the source code of the operating system. And, as initial versions of Android phones demonstrate, the smartphone vendors have every incentive to do so in order to differentiate their phones from others running on the Android platform. For example, Motorola sells its customized user interface as "MotoBlur" while HTC markets its user interface as "Sense."

Unfortunately, the freedom of smartphone manufacturers to modify the Android code has created significant hurdles for application software developers. Unlike the iPhone where a software application can be written once and run seamlessly on all versions of the iPhone, most software applications written for Android have to be customized for each smartphone. This limits the addressable market of an application to that of an individual smartphone rather than the Android platform itself.

Much has been made of the fact that the number of applications written for the Android platform has grown rapidly to over 10,000, exceeding the number written for BlackBerry, for example. In part, this rapid growth reflects the fact that in contrast to Apple, Google exercises little control over the applications written for the platform. Virtually anything goes. What counts, however, is not the total number of applications but rather their quality, variety, depth and usefulness. On this score, the Android library falls far short of the iPhone's. Many of Android's software applications represent shareware written by Linux developers rather than commercial applications that address the possible interests of users. The result is that the Android Market is not a smaller version of the iPhone App Store. Rather, as Prince McLean of Apple Insider notes, it's more like a "rummage sale."⁴ McLean's observation has been repeated by a number of other writers. Robert Scoble notes that the popular applications on Android are a far cry from comparable apps on the iPhone. As Scoble indelicately puts it,

"Facebook's UI sucks on Droid compared to the iPhone... The best Twitter app on Droid... does not even come close to ANY of the top five (Twitter) apps on the iPhone."⁵

Jason Kincaid of *Techcrunch* is not only critical of Android applications but also of Android's online store, called the Android Market.

"If there was a theme common to nearly every Droid review, it was that Android's app selection just doesn't cut it compared to the iPhone. I think that consensus is only half the story. These reviewers are finding that Android has a weaker selection of applications than the iPhone not just because some of their favorite apps aren't there, but because actually browsing the Market just isn't as enjoyable as what Apple's iTunes offers. If Android Market's perception as a poor man's App Store is going to change, this experience has to improve."⁶

Whether it will is an open question. Google has little interest in building a user-friendly applications store. First, the company makes its money selling ads and

³ Walter Mossberg "Motorola's Droid Is Smart Success for Verizon Users," *The Wall Street Journal*, Nov. 3, 2009.

⁴ Prince McLean, "Inside Google's Android and Apple's iPhone OS as Software Markets," *roughlydrafted.com*, Nov. 21, 2009.

⁵ Robert Scoble, "The Droid Fails as a Product When Compared to Palm Pre and iPhone," *scobelizer.com*, Nov. 8, 2009.

⁶ Jason Kincaid, "Android Market Badly Needs a Desktop Presence to Compete with the App Store," *The Washington Post*, Nov. 15, 2009.

paid search to mobile users. Indeed, to generate ad and paid search revenues, Google has ported all of its award-winning applications to the iPhone, robbing Android of any proprietary competitive advantage it might otherwise have had. Second, Google has only a modest incentive to make the store succeed because it does not sell hardware. In contrast, Apple has every incentive to make the iPhone App Store succeed because it does.

The ability to write sophisticated applications and games for Android is hampered by the amount of storage available for applications on Android phones. Applications are allotted at most 512 megabytes of internal memory compared to 16 gigabytes or more on the iPhone, and part of this memory must be allocated to the operating system itself.⁷ Many of the graphic-intensive games running on the iPhone already use 512 megabytes or more of memory. While the absence of sophisticated games is not a deal breaker, games and other entertainment applications do represent about a third of iPhone apps, and customers who buy them also are likely to buy applications in the other categories.

Finally, the proliferation of smartphones on the Android platform could weaken rather than strengthen Android's brand. That's because Google does not advertise the Android brand but rather has ceded ownership of the brand to the smartphone manufacturers and carriers. As noted, Verizon has seized on the "Droid" moniker as the label for its Android phones while the names of the phones themselves change from one carrier to the next. As a result, customers are unlikely to know (or possibly care) whether they're buying an Android phone. This, in turn, could hurt the ability of Android Market to attract customers to its site.

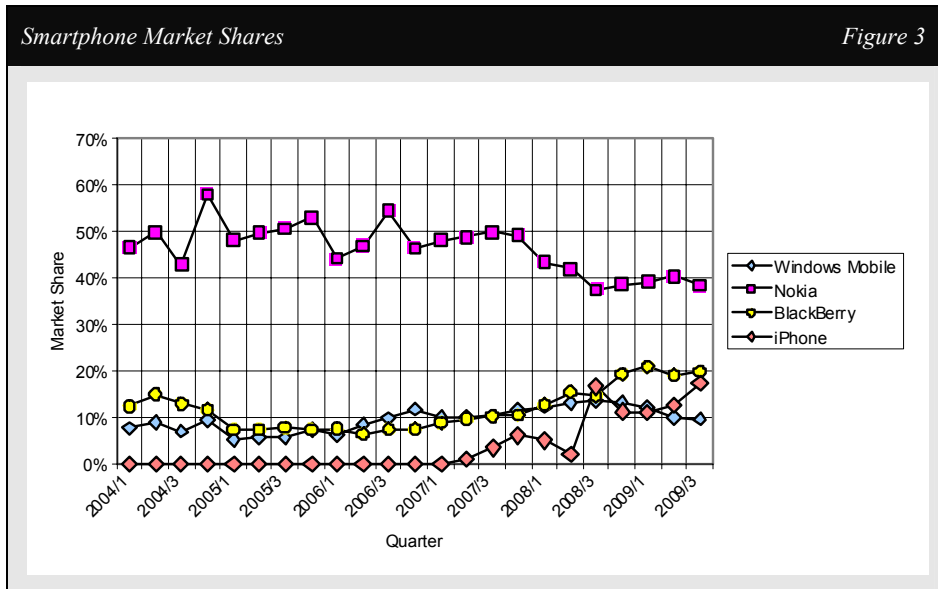
In summary, then, Android has won high praise for the Google applications embedded in its user interface. And the platform has been hailed as potentially the dominant operating system in the smartphone market because of the lineup of smartphone manufacturers who are building phones for it. However, it's an open question whether Android will live up to its promise because of the inherent contradictions embodied in the platform. In particular, Android is open source. Smartphone manufacturers have a powerful incentive to differentiate their phones and avoid the commoditization that characterized the PC industry. But such splintering could limit serious application development, preventing Android from emerging as a recognizable and leading brand in the smartphone space.

⁷ While users can add a 16-gigabyte external memory card to Android phones, this memory is reserved for music and video, not applications.

The Competitive Landscape in the September Quarter

Against a backdrop of 3.2% smartphone growth, BlackBerry was the big winner in September, increasing its share of the smartphone market to 19.8% from 14.5% a year ago. The big loser was Windows Mobile, whose market share declined to 9.6% from 13.4% a year ago. On sales out of the channel, Nokia experienced a decline in its market share to 39.3% from 42.3%. The iPhone's market share increased modestly to 17.3% from 16.6% based on sales into the carrier channel. But on sales out of the channel, as reported by Gartner, the iPhone's market share increased to 17.1% in September from 12.9% a year ago.

A discussion of each smartphone operating system platform and/or vendor follows.

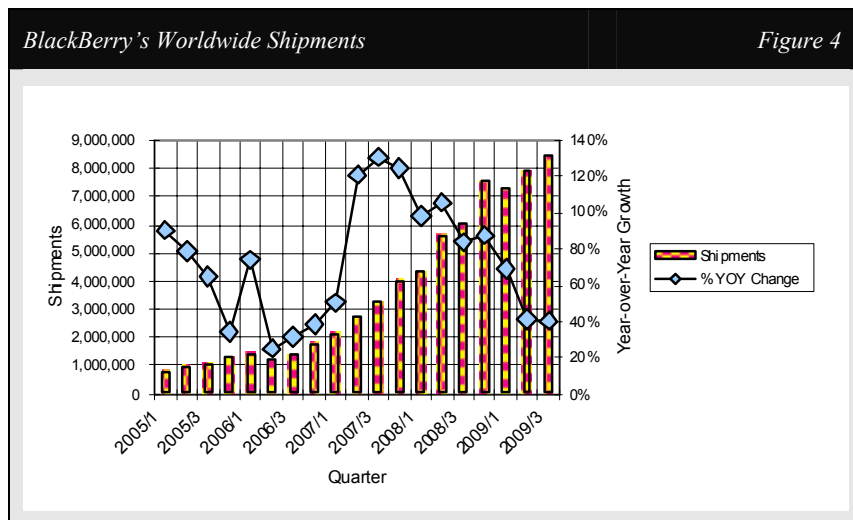


Source: IDC.

Research in Motion

Research in Motion was the major victim of the hysteria surrounding the launch of the Motorola Droid. The company's share price came under constant pressure throughout the fall. Part of this stemmed from the fear that Verizon would not market BlackBerry as aggressively as it had in the past because of its newfound infatuation with the Motorola Droid. And part can be attributed to the comments of Jim Balsillie, RIM's Co-CEO, on the company's second quarter earnings conference call. Investors interpreted Balsillie's comments, incorrectly in our opinion, that RIM's strategy of going "mainstream" in the smartphone market would invariably translate into lower gross margins and slowing earnings growth. Investors are also concerned that the iPhone might chip away at BlackBerry's hold on the enterprise market.

Such concerns were not evident in BlackBerry's performance in September, as shown in Figure 3. While shipment growth slowed to 40.5% from 83.9% a year ago, this growth was still 38 percentage points higher than the growth of the smartphone market itself.



Source: IDC.

As has been the pattern in recent years, RIM introduced several new BlackBerry models in advance of the holiday season. Among the models unveiled, the company introduced the Storm 2 on the Verizon network and the Bold 9700 on T-Mobile's 3G network to generally positive reviews. Last year's Storm 1, a superficial rip-off of the iPhone, was widely panned because the virtual keyboard was so difficult to use. However, RIM still managed to sell a reported million units of the Storm 1 after its year-ago launch.

The Storm 2 was praised for its new keyboard that corrected all of the flaws in the original model. But all of the comments were not positive ones. Walt Mossberg of *The Wall Street Journal* wrote,

"The browser is still inferior to Apple's Google's and Palm's. And the traditional BlackBerry interface cries out for a major overhaul in a touch device like this, especially when you add a lot of apps. RIM's menu and folder metaphor seems tired on this device."⁸

⁸ Walter Mossberg, "The Cliq and Storm 2 Join a Long Parade of iPhone Threats," *allthingsdigital.com*, October 14, 2009.

BlackBerry, which runs on a proprietary RIM operating system and relies on the Java Virtual Machine for application software development, has lagged behind the operating systems on competing smartphones, which, in turn, has slowed software development. Recognizing this, RIM is writing a new app-friendly version of its operating system. Despite the fact that BlackBerry is sold by over 300 carriers worldwide, sales are still concentrated in the U.S. As shown in Figure 4, BlackBerry had a 42.8% share of the U.S. smartphone market, and the U.S. represented 63.0% of worldwide sales. Latin America is the only region where BlackBerry's share is growing rapidly. The device has virtually no presence in Asia/Pacific, EMEA or Japan.

Distribution of BlackBerry's Mobile Market Share by Geographic Region

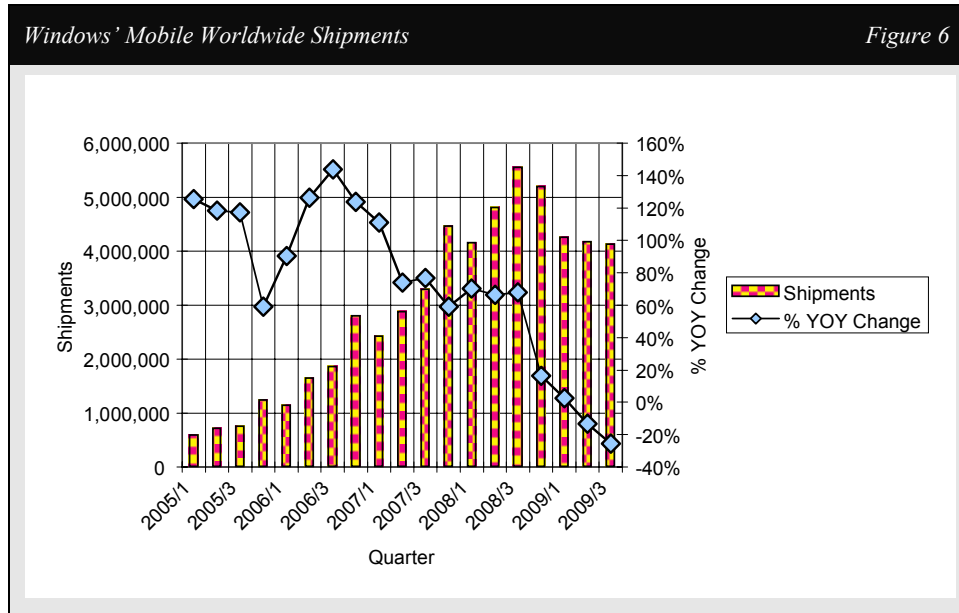
Figure 5

BlackBerry	2007/1	2007/2	2007/3	2007/4	2007	2008/1	2008/2	2008/3	2008/4	2008	2009/1	2009/2	2009/3
US	1,440,445	1,808,214	2,235,318	2,772,261	8,256,238	2,987,526	3,917,677	4,185,000	4,470,000	15,560,203	4,915,500	5,348,659	5,365,280
% market share	49.9%	46.8%	41.1%	35.1%	41.1%	44.5%	53.4%	40.4%	46.8%	45.8%	52.5%	49.4%	42.8%
Western Europe	407,288	485,106	503,955	650,212	2,046,561	670,118	813,671	755,502	1,563,696	3,802,987	1,100,550	1,156,943	1,412,506
% market share	9.0%	8.6%	8.9%	9.0%	8.9%	10.4%	11.5%	8.3%	16.6%	11.9%	14.4%	13.2%	15.8%
Asia Pacific	80,827	95,774	113,596	122,952	413,149	118,574	125,579	135,249	214,300	593,702	293,795	270,116	249,396
% market share	1.2%	1.4%	1.4%	1.4%	1.3%	1.7%	1.7%	1.7%	3.0%	2.0%	3.7%	3.0%	2.5%
Japan	5,000	9,000	5,000	0	19,000	0	2,000	6,000	5,000	13,000	0	0	0
% market share	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
Latin America	39,624	95,927	103,950	150,091	389,592	185,149	281,237	375,612	494,897	1,336,895	399,964	570,409	667,344
% market share	16.9%	18.3%	9.4%	7.8%	10.3%	9.5%	11.7%	13.6%	19.9%	13.9%	29.8%	36.1%	37.4%
Canada	195,000	220,000	276,438	306,000	997,438	295,400	401,813	465,000	702,000	1,864,213	384,500	462,000	545,000
% market share	81.8%	80.1%	76.8%	71.1%	76.5%	75.0%	78.8%	56.1%	71.9%	68.8%	70.3%	62.8%	61.4%
Rest of world	11,243	30,981	51,223	46,427	139,877	59,450	96,776	126,976	132,153	415,358	199,260	157,233	260,318
Total	2,179,428	2,745,003	3,289,481	4,047,944	12,261,856	4,316,218	5,638,754	6,049,340	7,582,047	23,586,359	7,293,570	7,965,361	8,499,845

Source: IDC.

Windows Mobile

Despite assertions to the contrary by Steve Ballmer, Microsoft's CEO, Windows Mobile appears headed to irrelevancy. As shown in Figure 3, Windows Mobile share of the smartphone market fell to 9.6% in September from 13.4% a year ago. In a market that was growing only modestly, the share decline reflected a 25.6% decline in shipments of Windows Mobile devices, as shown in Figure 6.



Source: IDC.

The decline reflects Microsoft's ineptness more than anything else. Microsoft boasts that it has over 30 Windows Mobile licensees. But just two, HTC and Samsung, accounted for 65.4% of Windows Mobile shipments in September. Many of Microsoft's major licensees are either partially or completely abandoning ship. Among them are Palm, which is now focused exclusively on its WebOS platform, as well as HTC, Motorola and Samsung, which have shifted their development efforts to the Android platform. The reason is that Windows Mobile is archaic and the most user-hostile operating system in the smartphone market. Microsoft did issue an update of its Windows Mobile operating system in September. The update, Windows Mobile 6.5, was the first in almost four years. But, as the headlines proclaimed, the update was a total bust.

"Windows Mobile 6.5: Call it 'Windows Immobile' "—Stephen Wildstrom, *BusinessWeek*, October 7, 2009

"Windows Mobile 6.5: There's No Excuse for This"—*Gizmodo*, October 6, 2009

John Herman, the author of the *Gizmodo* review, had some harsh words for the upgrade.⁹

"It's nowhere near the upgrade that Windows Mobile needs to be remotely interesting. It's a superficial update and not a very thorough one. It's an interim product, and a vain attempt to hold onto the thinning ranks of people who still choose Windows Mobile despite not being somehow tethered to it... And it won't work."

⁹ John Herman, "Windows Mobile 6.5: There's No Excuse for This," *gizmodo.com*, October 6, 2009.

Herman's review goes downhill from here.

"Things get worse when you move past the surface, revealing an OS that hasn't been fundamentally changed in years, and which bears a... startlingly non-weak resemblance to PocketPC 2002. The new home screen Start Menu, lock screen and contextual menus are just veneers, and they're not very thick."

"Windows Mobile finally, finally has an app store... but the initial offerings are pretty bare, counting among themselves just a few free apps, nearly all from Microsoft, with cameos by some recognizable Windows Mobile app developers who are still obliviously charging upwards of \$20 for apps that wouldn't break \$5 in the iPhone App Store."

We could go on. But the above comments capture the spirit of Herman's review. Microsoft plans to introduce a "modern" operating system, Windows 7. But it's not scheduled to arrive before late 2010. By then, Windows Mobile may not have any major licensees left, although if Windows 7 delivers on its promises, some may return.

As shown in Figure 7, Windows Mobile does not have a commanding market share in any region. The platform's share of the U.S. smartphone market has fallen from 32.1% in March 2007 to just 13.1% in September. A similar pattern holds in Western Europe, where Windows Mobile's share has fallen from 18.5% to 7.0% over this period. Windows Mobile has modestly increased its share in Asia/Pacific because of the presence of several licensees in this region.

Distribution of Windows' Mobile Market Share by Geographic Region

Figure 7

Windows Mobile	2007/1	2007/2	2007/3	2007/4	2007	2008/1	2008/2	2008/3	2008/4	2008	2009/1	2009/2	2009/3
US	927,269	1,255,680	1,378,865	1,945,637	5,507,451	1,499,500	1,673,883	1,769,603	1,479,901	6,422,887	1,580,139	1,543,306	1,643,225
% market share	32.1%	32.5%	25.4%	24.6%	27.4%	22.3%	22.8%	17.1%	15.5%	18.9%	16.9%	14.3%	13.1%
Western Europe	837,914	923,496	905,733	1,207,353	3,874,496	1,333,579	1,286,064	1,584,723	1,475,107	5,679,473	1,024,998	721,738	624,950
% market share	18.5%	16.4%	15.9%	16.7%	16.8%	20.8%	18.2%	17.5%	15.6%	17.7%	13.4%	8.2%	7.0%
Asia Pacific	574,195	521,196	615,192	714,196	2,424,779	705,489	854,537	939,599	1,056,063	3,555,688	981,866	1,048,446	1,132,053
% market share	8.6%	7.5%	7.4%	8.2%	7.9%	10.0%	11.8%	11.7%	14.7%	12.1%	12.5%	11.5%	11.1%
Japan	5,000	1,000	10,000	30,000	46,000	22,000	92,000	30,000	50,000	194,000	34,000	167,000	57,000
% market share	0.1%	0.0%	0.2%	0.5%	0.2%	0.4%	1.4%	0.7%	1.2%	0.9%	0.9%	2.9%	1.6%
EMEA	67,585	78,041	165,905	167,616	479,147	294,285	568,848	876,032	785,409	2,524,574	411,336	414,850	371,473
% market share	1.7%	1.9%	2.9%	2.6%	2.3%	5.7%	10.0%	13.7%	14.6%	11.2%	9.9%	8.1%	7.3%
Latin America	6,618	76,601	166,801	293,108	543,128	212,839	264,119	277,904	269,968	1,024,830	203,348	243,397	261,973
% market share	2.8%	14.6%	15.2%	15.2%	14.3%	10.9%	11.0%	10.1%	10.9%	10.7%	15.1%	15.4%	14.7%
Rest of world	27,722	37,220	70,461	120,949	256,354	97,619	81,486	84,229	94,894	358,230	34,799	48,317	47,500
Total	2,446,304	2,893,235	3,312,958	4,478,860	13,131,355	4,165,312	4,820,938	5,562,091	5,211,343	19,759,682	4,270,487	4,187,054	4,138,174

Source: IDC.

Nokia

Although it still holds a commanding lead in the smartphone market, Nokia is reeling. The company's market share has fallen about 10 percentage points from 47.8% in March 2007 to 38.2% in September. Nokia is counting on the N900 to reverse the loss of market share. A longtime Symbian licensee, the company switched to a variant of the Linux operating system on the N900, dubbed Maemo. The N900 can run several programs at once, browse the Web wirelessly and display graphics and video as fast as a PC.

Whether Nokia can stem the loss of share in the smartphone market is an open question. As Michael Gartenberg recently wrote:

"It's the largest cell phone maker in the world, with the largest share of any smartphone vendor in the world. Yet I increasingly look at Nokia's products and listen to its strategy wondering if the company can remain relevant in a mobile world that's changed drastically over the last two years."

"The N900 feels more like a science experiment than a product that's designed for mainstream users. I used to feel Nokia's hardware designs defined cool, but these days they just remind me of an aging movie starlet trying to recapture some former beauty."

"... my good friend... said, 'Nokia has a classic innovator's dilemma: they're so big and have been so dominant that it's been hard for them to create innovative new products which might cannibalize their existing product lines.' I think it's more than that. Nokia failed to lead a changed market and has been forced into reacting to competitors instead of driving its own vision of the future. As smartphones left the realm of the enthusiasts and became mass-market in terms of adoption and feature use, Nokia fell behind."¹⁰

Distribution of Nokia's Mobile Market Share by Geographic Region *Figure 8*

	2007/1	2007/2	2007/3	2007/4	2007	2008/1	2008/2	2008/3	2008/4	2008	2009/1	2009/2	2009/3
US	37,100	79,000	202,500	153,000	471,600	100,000	88,558	140,000	270,000	598,558	243,857	310,226	305,200
% market share	1.3%	2.0%	3.7%	1.9%	2.3%	1.5%	1.2%	1.4%	2.8%	1.8%	2.6%	2.9%	2.4%
Western Europe	2,889,098	3,916,800	3,711,420	4,500,410	15,017,728	3,575,000	4,200,000	4,300,124	5,020,300	17,095,424	4,350,478	5,040,974	4,140,764
% market share	63.8%	69.4%	65.2%	62.4%	65.1%	55.7%	59.4%	47.4%	53.2%	53.4%	56.8%	57.5%	46.4%
Asia Pacific	5,042,603	5,715,590	6,499,839	7,247,277	24,505,309	5,610,350	5,322,881	5,552,898	4,929,993	21,416,122	5,582,310	6,838,126	7,527,489
% market share	75.5%	81.8%	78.7%	83.2%	80.0%	79.3%	73.6%	69.3%	68.7%	72.6%	71.2%	74.8%	74.0%
Japan	0	0	0	0	0	90,000	77,000	15,000	0	182,000	0	0	0
% market share	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	1.2%	0.4%	0.0%	0.9%	0.0%	0.0%	0.0%
EMEA	3,679,512	3,942,594	5,228,330	6,075,863	18,926,299	4,571,803	4,792,954	4,771,195	3,853,639	17,989,591	3,000,743	4,049,883	3,830,519
% market share	94.5%	95.4%	90.2%	92.5%	92.8%	88.6%	84.0%	74.7%	71.4%	79.5%	72.3%	79.0%	75.1%
Latin America	129,940	209,000	335,086	782,528	1,456,554	697,013	799,807	701,283	1,000,068	3,198,171	457,199	616,790	589,838
% market share	55.3%	39.9%	30.4%	40.5%	38.4%	35.7%	33.4%	25.4%	40.2%	33.4%	34.0%	39.0%	33.0%
Rest of world	4,698	2,998	(2)	(2)	7,690	(2)	18,798	19,498	25,998	64,292	22,998	20,369	16,398
Total	11,782,953	13,865,984	15,977,175	18,759,078	60,385,183	14,644,166	15,300,000	15,500,000	15,100,000	60,544,160	13,657,587	16,876,370	16,410,210

Source: IDC.

¹⁰ Michael Gartenberg, "Entelligence: What's the Future of Nokia?" *engadget.com*, December 1, 2009.

The distribution of Nokia's market share by region is a source both of strength and weakness. Nokia holds a dominant market share in a number of regions, although with the exception of Asia/Pacific, its market share is declining. As the iPhone and BlackBerry have invaded Europe, Nokia's share in this region has fallen from 63.8% in March 2007 to 46.4% in September. The company's market share in the EMEA region has fallen from 94.5% to 75.1% while its share of the Latin American market has fallen from 55.3% to 33.0% during this period.

Nokia's conspicuous weakness is in the U.S., where it holds just a 2.4% share. This weakness is particularly troubling because it could severely limit the interest of software developers (most of who live in the U.S.) from writing applications for the Maemo platform. It's unlikely that Nokia can gain a material share of the U.S. market without a compelling library of smartphone software applications. Gartenberg went a step further, extending this argument to the worldwide market: "Without a clear platform strategy, it's going to be difficult for Nokia to get the developer mindshare required to stay relevant in the mass market."¹¹

¹¹ Ibid.

The iPhone

As measured by sales into the carrier channel, the increase in the iPhone's market share was just 7.7% in September. But as Apple noted on its fourth quarter conference call, the sell-through of the iPhone increased 38% year over year. By Gartner's estimates, it was an even higher 49.2%. The iPhone continues to represent the gold standard in the smartphone market. With the arrival of each new smartphone, the first question reviewers ask is, "Is it an iPhone killer?" To date, no smartphone has accomplished this, and it's unlikely that any will in the foreseeable future. Arguably the Palm Pre has come the closest. But efforts to build the Pre application store have not gotten off the ground in the six months the Pre has been on the market.

Many smartphones match or exceed the feature set on the iPhone. But the success of a smartphone goes way beyond its features. What no smartphone has been able to match is the iPhone's software, most notably the user interface, which arguably is one of the key attributes, if not the key attribute of a smartphone in a consumer's eyes. In addition, of course, the iPhone's App Store, now 100,000 applications strong and counting, puts every competitor to shame. In our opinion, this situation is unlikely to change because of Apple's maniacal focus on the user's experience. In contrast to Android whose upgrades enter the market in dribs and drabs, the iPhone operating system's periodic upgrades are spread almost instantaneously through the installed base of owners. As a result, applications that take advantage of features in a new release are quickly available to all iPhone owners.

Since it arrived on the scene in the middle of 2007, the distribution of the iPhone has spread to more than 80 countries. In several, multiple carriers sell the iPhone.¹² As shown in Figure 9, the iPhone's highest market shares are in the U.S. and Western Europe—29.2% and 23.5%, respectively. This in part reflects the availability of the iPhone in these two regions first. The iPhone holds a 9.2% share of the Japanese market, a surprisingly high percentage in view of predictions that the phone would likely fail in this country. The iPhone's modest share in Asia/Pacific reflects the failure of smartphones to catch on in China and the fact the iPhone entered the country only recently through a partnership with China Unicom. In contrast with South Korea, where over 60,000 iPhones were sold on its first weekend, sales in China have been notably soft. In Korea, the iPhone and carrier subscription plans are priced in line with the U.S. In contrast, China Unicom priced the iPhone substantially above the prices of the two million iPhones that have entered the country through the grey market. In addition, the initial batch of iPhones had their WiFi capability disabled because of Chinese law (since relaxed). Clearly, China Unicom will have to lower its prices if the carrier harbors any hope of competing with the grey market.

Distribution of iPhone's Mobile Market Share by Geographic Region

Figure 9

	2007/1	2007/2	2007/3	2007/4	2007	2008/1	2008/2	2008/3	2008/4	2008	2009/1	2009/2	2009/3
US		270,000	1,119,000	2,115,000	3,504,000	1,290,874	543,486	3,110,479	2,138,755	7,083,594	1,732,000	2,700,000	3,660,000
% market share		7.0%	20.6%	26.7%	17.4%	19.2%	7.4%	30.1%	22.4%	20.9%	18.5%	25.0%	29.2%
Western Europe				202,982	202,982	408,926	173,724	1,987,439	1,003,616	3,573,705	931,606	1,359,765	2,100,010
% market share				2.8%	0.9%	6.4%	2.5%	21.9%	10.6%	11.2%	12.2%	15.5%	23.5%
Asia Pacific								384,937	224,568	609,505	257,892	335,299	593,994
% market share								4.8%	3.1%	2.1%	3.3%	3.7%	5.8%
Japan								300,000	305,000	605,000	300,000	305,000	325,000
% market share								7.2%	7.2%	2.9%	7.5%	5.3%	9.2%
EMEA						4,719	43,443	320,695	380,677	749,534	378,084	339,421	479,867
% market share						0.1%	0.8%	5.0%	7.1%	3.3%	9.1%	6.6%	9.4%
Latin America								550,000	193,842	743,842	100,664	19,006	79,886
% market share								19.9%	7.8%	7.8%	7.5%	1.2%	4.5%
Canada		(0)	(0)	(0)	(1)	(0)	(0)	254,999	149,999	404,998	94,999	135,999	204,999
Total		270,000	1,119,000	2,317,982	3,706,982	1,704,519	760,653	6,908,550	4,396,458	13,770,179	3,795,246	5,194,491	7,443,757

Source: IDC.

¹² For example, the iPhone simultaneously launched on three carriers in Israel on December 10.

Palm Pre

Palm shipped 616,000 Palm Pres in the September quarter, capturing 1.4% of the smartphone market. Palm introduced the Palm Pixi, also on the Sprint network, in November. Reviews of the Pre were uniformly outstanding, but reviews of the Pixi have been mixed. While praising Palm's WebOS operating system, Katherine Boehret of *The Wall Street Journal*, pointed out some negative aspects of the Pixi, such as the absence of a WiFi capability and presence of a slow processor that robbed WebOS of its "lightning-fast" speed.¹³

The most troubling aspect of the Pre and Pixi rollouts has been the rapid deterioration of suggested retail prices. The Pre was introduced at a \$200 price point (after a \$100 mail-in rebate) but is now selling for \$80 on Amazon and \$80 at Wal-Mart. The Pixi was introduced at \$99. But within a few days, both Amazon and Wal-Mart were selling the Pixi at \$25.

The price cuts do not affect Palm's pricing of the two models, just the amount Wal-Mart and Amazon earn. Clearly these prices are below cost. But Sprint pays Wal-Mart and Amazon commissions of \$100 to \$200 on these sales, which makes up for the losses.

Our concern is the signal these discounts send to the market and their impact on the value of the Palm brand. The signal is these retailers can't sell the desired volume of Pres and Pixis at suggested retail prices. While the discounts may stimulate sales in the short run, they could cause considerable harm to the Palm brand in the eyes of consumers in the longer run.

¹³ Katherine Boehret, "Palm Pixi Needs a Dusting of Speed," *The Wall Street Journal*, November 17, 2009.

	2007/1	2007/2	2007/3	2007/4	2007	2008/1	2008/2	2008/3	2008/4	2008	2009/1	2009/2	2009/3
Symbian-powered													
Nokia	11,782,953	13,865,984	15,977,175	18,759,078	60,385,190	14,644,166	15,300,000	15,500,000	15,100,000	60,544,166	13,657,587	16,876,370	16,410,210
% share	47.8%	48.6%	49.7%	48.9%	48.8%	43.2%	41.7%	37.3%	38.5%	40.0%	39.1%	40.3%	38.2%
YOY growth	39.1%	53.6%	53.6%	68.7%	54.7%	24.3%	10.3%	-3.0%	-19.5%	0.3%	-6.7%	10.3%	5.9%
Fujitsu	1,080,000	1,730,000	1,600,000	1,380,000	5,790,000	1,150,000	1,605,000	890,000	760,000	4,405,000	1,310,000	1,600,000	1,150,000
Mitsubishi	900,000	590,000	330,000	390,000	2,210,000	360,000	90,000	0	0	450,000	0	0	0
Motorola	0	30,000	255,653	260,626	546,279	211,479	140,550	71,053	38,209	461,291	16,991	12,328	14,821
Samsung	12,747	28,987	16,817	16,823	75,374	75,731	272,400	161,619	263,302	773,052	147,049	177,675	218,181
Sony-Ericsson	763,975	625,195	850,437	1,055,438	3,295,045	470,196	772,819	701,257	247,267	2,191,539	122,791	58,734	74,526
Sharp	1,370,000	1,950,000	1,155,000	1,060,000	5,535,000	1,200,000	1,250,000	690,000	975,000	4,115,000	585,000	1,010,000	655,000
Others	37,271	22,920	37,053	112,172	209,416	85,127	95,778	124,412	357,014	662,331	58,601	89,133	83,175
Total	15,946,947	18,843,087	20,222,136	23,034,138	78,046,308	18,196,700	19,526,548	18,138,341	17,740,792	73,602,381	15,898,019	19,824,241	18,605,913
% share	64.7%	66.1%	62.9%	60.0%	63.1%	53.7%	53.2%	43.6%	45.2%	48.6%	45.6%	47.3%	43.3%
YOY growth	36.6%	53.1%	56.1%	53.5%	50.2%	14.1%	3.6%	-10.3%	-23.0%	-5.7%	-12.6%	1.5%	2.6%
RIM Blackberry-powered	2,179,651	2,745,003	3,288,988	4,047,944	12,261,586	4,316,218	5,638,754	6,049,340	7,582,047	23,586,359	7,293,570	7,965,361	8,499,845
% share	8.8%	9.6%	10.2%	10.5%	9.9%	12.7%	15.4%	14.5%	19.3%	15.6%	20.9%	19.0%	19.8%
YOY growth	50.3%	121.0%	130.7%	124.8%	107.2%	98.0%	105.4%	83.9%	87.3%	92.4%	69.0%	41.3%	40.5%
Apple Mac OS-powered	0	270,000	1,119,000	2,317,892	3,706,892	1,704,519	760,653	6,908,550	4,396,458	13,770,180	3,795,246	5,194,491	7,443,757
% share		0.9%	3.5%	6.0%	3.0%	5.0%	2.1%	16.6%	11.2%	9.1%	10.9%	12.4%	17.3%
YOY growth							181.7%	517.4%	89.7%	271.5%	122.7%	582.9%	7.7%
Android													
T-Mobile									691,378	691,378	578,887	423,267	827,660
HTC											18,238	442,269	518,389
Samsung													4,163
Other											0	2,174	3,620
Total									691,378	691,378	597,125	867,710	1,353,832
% share									1.8%	0.5%	1.7%	2.1%	3.2%
Windows Mobile													
ASUS	23,490	32,069	32,967	27,119	115,645	43,949	61,571	109,984	96,432	311,936	44,591	44,680	38,445
Coolpad	118,686	71,957	79,023	91,528		74,048	74,456	70,298	98,923		126,995	154,291	255,837
Dopod	196,234	178,743	132,513	154,544	662,034	132,825	182,547	197,035	214,768	727,175	238,097	248,315	45,677
HP	104,635	113,125	117,143	89,457	424,360	67,326	61,027	54,690	33,737	216,780	47,518	17,764	26,404
HTC	275,421	347,241	816,978	1,588,302	3,027,942	1,431,021	1,708,744	2,121,482	2,239,222	7,500,469	1,515,974	1,622,311	1,641,065
LG	0	9,400	9,400	10,740	20,140	28,914	123,408	124,419	74,911	351,652	88,297	150,847	163,764
Motorola	351,738	517,368	446,534	455,936	1,771,576	269,621	398,992	317,588	176,455	1,162,656	200,698	229,406	194,592
O2	156,734	127,057	80,914	77,883	442,588	80,438	72,277	93,114	101,010	346,839	37,584	23,829	24,517
Palm	223,210	279,377	226,510	215,240	944,337	212,691	173,929	223,800	115,579	725,999	196,353	215,854	90,516
Samsung	385,669	536,201	502,522	774,892	2,199,284	947,373	1,130,605	1,369,705	1,219,871	4,667,554	1,215,341	897,867	1,067,264
T-Mobile	197,208	222,626	381,652	494,061	1,295,547	346,309	269,293	260,136	174,683	1,050,421	116,727	173,633	192,340
Verizon Wireless	26,500	38,500	21,300	87,500	173,800	70,875	107,000	158,670	200,800	537,345	80,000	51,000	12,300
Vodafone	19,500	15,837	16,310	21,019	72,666	24,460	11,321	22,627	11,000	69,408	4,342	3,000	6,000
Others	55,272	141,081	152,995	154,626	503,974	211,676	200,979	196,745	225,133	834,533	226,171	312,345	324,194
Total	2,446,304	2,893,235	3,312,958	4,478,860	12,842,829	4,165,312	4,820,938	5,562,091	5,211,343	19,511,367	4,270,487	4,187,054	4,138,174
% share	9.9%	10.1%	10.3%	11.7%	10.4%	12.3%	13.1%	13.4%	13.3%	12.9%	12.2%	10.0%	9.6%
YOY growth	111.2%	73.9%	76.8%	59.1%	344.6%	70.3%	66.6%	67.9%	16.4%	51.9%	2.5%	-13.1%	-25.6%
Palm OS													
Palm	673,828	543,547	468,594	566,675	2,252,644	796,446	744,704	753,989	359,583	2,654,722	208,720	105,121	73,795
Others	4,777	612	454	55	5,898	(249)	1,310	120	205	1,386	0	0	0
Total	678,605	544,159	469,048	566,730	2,258,542	796,197	746,014	754,109	359,788	2,656,108	208,720	105,121	73,795
% share	2.8%	1.9%	1.5%	1.5%	1.8%	2.3%	2.0%	1.8%	0.9%	1.8%	0.6%	0.3%	0.2%
Palm WebOS													
% share												285,000	616,465
											0.7%	1.4%	
Linux													
NEC	1,080,000	1,190,000	910,000	1,120,000	4,300,000	1,590,000	1,505,000	900,000	1,135,000	5,130,000	865,000	1,235,000	695,000
Motorola	1,239,551	809,440	1,503,954	1,613,558	5,166,503	1,466,119	2,198,842	2,020,956	1,339,400	7,025,317	1,006,519	743,738	740,628
Panasonic	1,190,000	1,195,000	1,000,000	1,115,000	4,500,000	1,440,000	1,375,000	940,000	990,000	4,745,000	885,000	1,395,000	655,000
Others	9,456	24,686	327,716	87,437	449,295	221,555	107,513	313,787	65,738	708,993	68,862	78,366	109,179
Total	3,519,007	3,219,126	3,741,670	3,935,995	14,415,798	4,717,674	5,186,355	4,174,743	3,530,138	17,608,910	2,825,381	3,452,104	2,199,807
% share	14.3%	11.3%	11.6%	10.3%	11.7%	13.9%	14.1%	10.0%	9.0%	11.6%	8.1%	8.2%	5.1%
YOY growth													-47.3%
Total	24,632,294	28,524,595	32,154,295	38,381,649	123,692,833	33,896,620	36,679,262	41,587,174	39,241,944	151,405,000	34,888,548	41,883,082	42,931,588
YOY growth	27.9%	47.6%	67.7%	59.6%	51.2%	37.6%	28.6%	29.3%	2.2%	22.4%	2.9%	14.2%	3.2%
Mobile phones	230,240,432	237,048,699	257,416,550	292,502,300	1,017,207,981	256,776,603	265,253,545	263,527,364	253,157,534	1,038,715,046	206,565,029	229,983,913	246,296,984
% share	9.6%	10.0%	9.6%	6.2%	1.1%	11.5%	11.9%	2.4%	-13.5%	2.1%	-19.6%	-13.3%	-6.5%
Total phones	254,872,726	265,573,294	289,570,845	330,883,949	1,140,900,814	290,673,223	301,932,807	305,114,538	292,399,478	1,190,120,046	241,453,577	271,866,995	289,228,572
% Smartphones	9.7%	10.7%	11.1%	11.6%	10.8%	11.7%	12.1%	13.6%	13.4%	12.7%	14.4%	15.4%	14.8%

Source: IDC.

Charles Wolf

Mr. Wolf joined Needham & Co., LLC in 2000. He began an 18-year career in the Finance Division of the Columbia Business School in 1966, rising from assistant professor to professor, during which time he published many articles on financial economics and decision theory in major academic journals. He is also co-author of *The Role of Private Placements in Corporate Finance*, published by Harvard University Press. Mr. Wolf joined the equity research department at Credit Suisse First Boston (then The First Boston Company) in 1984. Between 1988 and 1993, he was elected to Institutional Investor's "All-America Research Team" in the personal computer industry category. Between 1993 and 1996, he was a consultant to CS First Boston, managing the "New Analysts Program" and writing on the Economic Value Added approach to stock analysis. In May 1996, he rejoined CS First Boston as an analyst covering the PC industry, a position held until October 1998. From November 1998 to November 2000, Mr. Wolf was an analyst covering the PC and enterprise hardware industries at UBS Warburg. Charlie's signature publications, *Wolf Bytes* and *Wolf Bits*, provide in-depth analysis of significant industry issues. He earned his AB, MBA and DBA degrees from Harvard.

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Palm	PALM	11.67	Underperform	B, G
Research in Motion	RIMM	61.16	Buy	B, G

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I, Charlie Wolf, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject company (ies) and its (their) securities. I also certify that I have not been, am not, and will not be receiving direct or indirect compensation in exchange for expressing the specific recommendation(s) in this report.



Price, Rating, and Price Target History: Apple Inc. (AAPL/NASDAQ) as of 12-11-09



Source: Factset (Prices) / Needham (ratings and target price)

Disclosures applicable to this security: A, B, G.

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Price, Rating, and Price Target History: Palm Inc. (PALM/NASDAQ) as of 12-11-09



Source: Factset (Prices) / Needham (ratings)

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Price, Rating, and Price Target History: Research in Motion (RIMM/NASDAQ) as of 12-11-09



Source: Factset (Prices) / Needham (ratings and target price)

Disclosures applicable to this security: B, G.

	% of companies under coverage with this rating	% for which investment banking services have been provided for in the past 12 months
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Rating Suspended	5	12
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