Bressler Decl. In Support of Apple's Opp. to Samsung's Mot. For Summary Judgment

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All values in U.S. dollars unless otherwise noted.

For Required Disclosures, please see page 53.

Wireless Industry

Sizing the Global Smartphone Market

We believe the global Smartphone market will exhibit growth outperformance (37% CAGR versus 7% CAGR for the mobile phone market), driven by four key factors: 1) disruptive innovations in mobile software and hardware; 2) rising consumer/business demand for mobile data (messaging, browsing, applications); 3) faster wireless networks; and 4) mass market Smartphone and data pricing. In this report, RBC sizes the global Smartphone market, and recommends investors with long-term (12-18 month) time horizons overweight Apple (AAPL), Research in Motion (RIMM), and Microsoft (MSFT). More speculative names we would recommend include Google (GOOG) and Palm (PALM).

- **Smartphone Market Expansion.** RBC sees the global adoption of Smartphones rising over the next four years, expanding 37% CAGR, versus 7% CAGR for the mobile phone market (3% mass market phones). When defined as "data-centric" Smartphones (sold with data plans), RBC sees Smartphone Market expanding from over 80 million units sold in calendar year 2007 or 7% Total Addressable Handset Market (TAM) , to 294 million units in calendar year 2011 or 20% TAM. RBC estimates there will be 449 million Smartphone users globally by calendar year 2011, up from estimates of 102 million by the end of calendar year 2007.
- **Historic Confluence.** Our outlook is based upon a historic confluence of factors: 1) iconic Smartphones like Apple's iPhone, Blackberry's Storm, Google's Android, etc.; 2) global transition from voice-only handsets to Smartphones, driven by demand for mobile email, browsing and mobile content/applications; 3) advancements in handset technologies offering compelling user experiences; 4) faster 3G networks and carrier focus on data; 5) lower handset/data pricing reaching mass-market inflection points; 6) momentum of mobile application platforms and third party mobile applications; and 7) mobilization of business.
- **Recession Resistant.** Amidst the global economic slowdown, RBC views the Smartphone market – while not recession-proof – as a "market within a market", outperforming the general handset market, because: 1) mobile data services like email are 'sticky' (less discretionary); 2) the market is international, with developing economies offsetting slower regions; 3) lower data and handset pricing trends improve affordability; and 4) new product cycles. Although we expect growth to slow to 21% year-over-year in calendar year 2009 (from 52% year-over-year calendar year 2008), we expect Smartphone shipments to grow 37% CAGR by calendar year 2011. Our Scenario Analysis shows 30% upside to our Smartphone Growth Forecast under 2%+ calendar year 2009 GDP and, 30% downside under -2% calendar year 2009 GDP.
- **Vendor Share Shifts.** While facing interim growth/margin threats from economic slowdown, this outlook offers long term positive implications for RIM, Apple, Google Android and Windows Mobile Smartphones. RBC forecasts Apple and RIM continuing to gain share from incumbent vendors Motorola, Nokia (including Symbian), LG, and Samsung. With estimates at 1% of TAM (14% Smartphones), RIM need only achieve 1.9% of TAM in calendar year 2008 and 2.8% of TAM in calendar year 2009 to exceed RBC growth expectations in the next two years. Similarly, with 0.3% of TAM (4.4% share data-centric Smartphones), Apple need only achieve 1.2% of TAM in calendar year 2008 and 1.7% of TAM in calendar year 2009 to exceed RBC iPhone growth expectations in the next two years. HTC-branded (estimate 0.3% of TAM), Google Android and Windows Mobile Smartphones are also expected to gain share, although the extent to which depends on building competitive advantages, and successful uptake of pending product cycles. (RBC forecasts 1.1% of TAM for Google, 2.9% for Microsoft by calendar year 2011).

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Executive Summary

Sizing the Global Smartphone Market

We believe the global Smartphone market is entering a period of growth outperformance (37% CAGR versus 7% CAGR for the mobile phone market), driven by four key factors: 1) disruptive innovations in mobile software and hardware; 2) rising consumer/business demand for mobile data (messaging, browsing, applications); 3) faster wireless networks; 4) mass market Smartphone and data pricing. In this report, RBC sizes the global Smartphone market, and recommends investors with long-term (12-18 month) time horizons overweight Apple (AAPL), Research in Motion (RIMM), Microsoft (MSFT). More speculative names we would recommend include Google (GOOG) and Palm (PALM).

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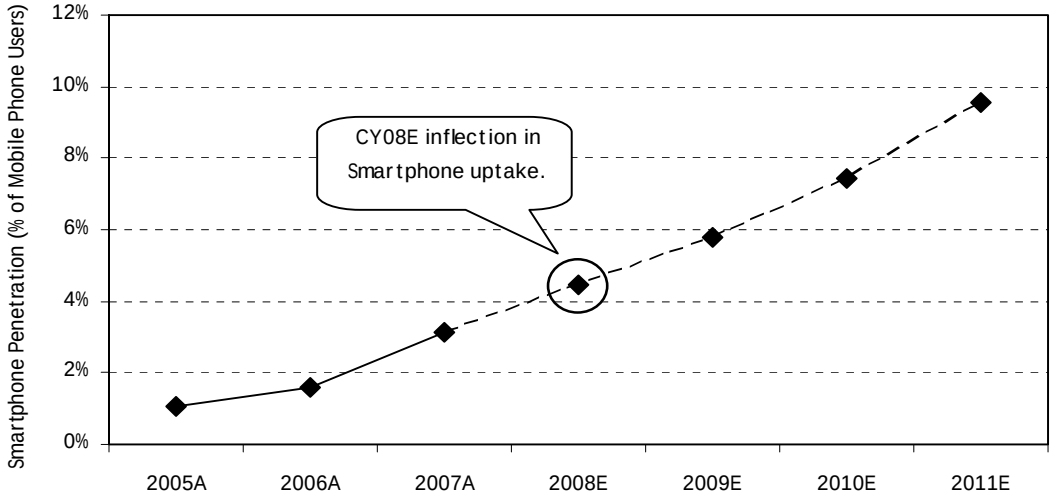
Smartphones on the Rise

Smartphones on the Rise. Just as the PC had its emergence in the 1980s and the Internet in the 1990s, we believe the next decade will see Smartphones – mobile devices with advanced PC-like features, QWERTY input, unique form factors, personalization, advanced software, integrated and third party applications – proliferate to become a global accessory. Despite the headlines, Smartphones still remain a niche of the overall phone market – only about 7% total handsets shipped in 2007 were Smartphones, a small portion of the 1.1 billion phones shipped globally in 2007. Yet the Smartphone market is expanding from a niche to a broad-based handset category because of their promise to transform traditional voice-only/SMS usage into enhanced mobile computing experiences. Smartphones offer improved ways to communicate and connect (email, instant messaging, social networking, multimedia messaging, etc); browse and search the mobile internet with the richness of the desktop; entertain (music, movies, games, pictures, video, etc); interact and collaborate (blogs, MySpace, Twitter, Facebook, Flickr, etc); organize life and work (calendar, contacts, notes, PIM, etc); transact (search, browse, shop, buy, bank, etc); find and guide (location based applications, local search, directory services, mapping, etc); stay informed (news, alerts, weather, traffic, etc); mobilize the office (corporate email, corporate applications, PBX Integration, mobile desktop, etc.) and; *do thousands of things we haven't yet thought of or foreseen*. Even with the global economic slowdown, RBC sees 2008/09 as an 'inflection point' in Smartphone adoption; advances in network and handset technology are allowing Smartphones to deliver on the promise of 'converged' portable computing devices, with high-resolution, interactive displays, longer battery life, faster processors, greater storage, multimodal wireless technologies (2G/3G, GSM/CDMA, Wi-Fi, Bluetooth), media features (higher-quality cameras, speakers, music players, etc) and other capabilities (GPS, accelerometers, etc). Growing global adoption of mobile email, mobile browsing and mobile applications are expanding the Smartphone market into new segments (youth, students, mature users, women, small business, vertical markets, etc). Smartphones are thus displacing MP3/portable movie players, digital cameras, GPS devices, and portable gaming consoles – even laptops.

Exhibit 1. Expected Growth in Global Smartphone Penetration

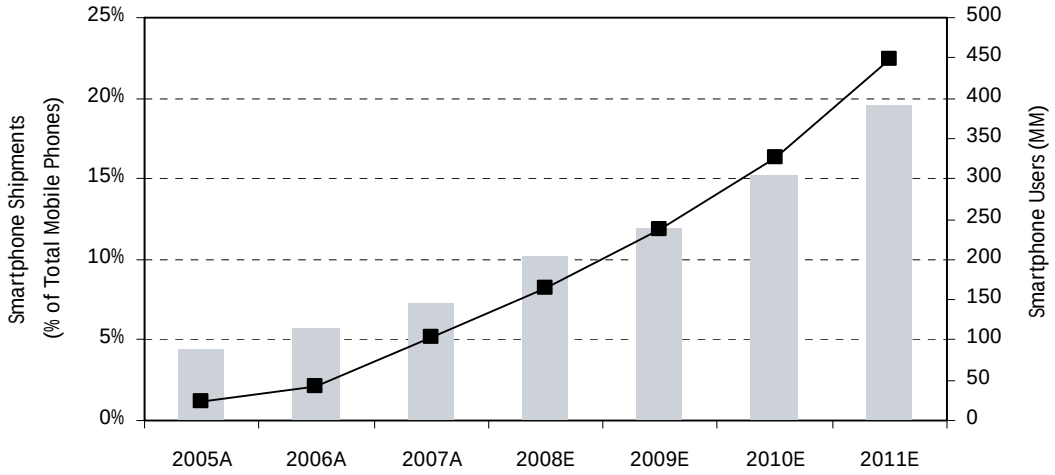


	2005A	2006A	2007A	2008E	2009E	2010E	2011E
Smartphone Penetration (% of Mobile Phone Users)	1.0%	1.6%	3.1%	4.4%	5.8%	7.4%	9.6%

Source: RBC Capital Markets Research

Global Transition from Voice to Smartphones. RBC estimates global Smartphone penetration to grow from 3.1% of phone users in calendar year 2007 (an estimated 102 million users) to 9.6% by calendar year 2011 (an estimated 449 million users), at 45% CAGR, driven by a strong global replacement cycle globally, as buyers upgrade from voice-only/SMS phones to Smartphones. Smartphone shipments (an estimated 83 million in calendar year 2007) at 7% of TAM (Total Addressable Market, or 1.1 billion calendar year 2007) are expected to rise to an estimated 294 million shipped or 19.6% of TAM by calendar year, 37% CAGR.

Exhibit 2. Forecasted Growth in Global Smartphone Units and Users (% of Total Mobile Phones/Users)



	2005A	2006A	2007A	2008E	2009E	2010E	2011E
Global Smartphone Shipments (MM)	36.7	57.0	83.3	126.8	153.5	208.4	294.0
Smartphone % of Total Mobile Phones	4.5%	5.8%	7.3%	10.2%	11.9%	15.2%	19.6%
Global Smartphone Users (MM)	22.7	42.8	102.3	165.2	236.1	326.5	448.7
Smartphone Users % of Total Mobile Phone Users	1.0%	1.6%	3.1%	4.4%	5.8%	7.4%	9.6%

Source: RBC Capital Markets Research

Historic Confluence

Inflection Point for Smartphone Adoption. 2007-2009 in our view represents a historic inflection point; after several years as a niche, global Smartphone penetration is accelerating, driven by a convergence of factors: 1) iconic Smartphones like Apple's iPhone, Blackberry's Bold and Storm, Nokia's 5800 XpressMusic 'Tube' and E71, Sony Ericsson's XPERIA X1, HTC's Touch Diamond, others; 2) global transition from voice-only handsets to Smartphones, driven by demand for mobile email, browsing and applications; 3) advancements in handset technologies fulfilling the promise of compelling mobile user experiences; 4) faster 3G networks and heightened global carrier focus (and competition) on data services; 5) lower handset/data pricing reaching mass-market inflection points; 6) momentum of mobile applications platforms and proliferation of third party mobile applications; and 7) mobilization of business.

Exhibit 3. Confluence of Factors Driving Smartphone Adoption in 2008 and Beyond

Global transition underway from voice-only phone (including SMS) to voice/data phones with email, browsing, etc, driven by:

- Cheaper, more powerful, iconic Smartphones
- Proliferation of mobile email and mobile browsing
- Growing interest in multimedia messaging (photo, video, etc), mobile music, social networking, location based services, etc.
- Momentum of mobile applications platforms and proliferation of third party mobile applications
- Increasing buyer interest in customization (third party applications, games, software, etc)
- Lower handset/data plan pricing trends globally
- Faster 3G networks
- Device convergence (GPS, music, camera, game console, media player, etc)
- Mobilization of Business

Source: RBC Capital Markets Research

Smartphone Market Growth drivers include:

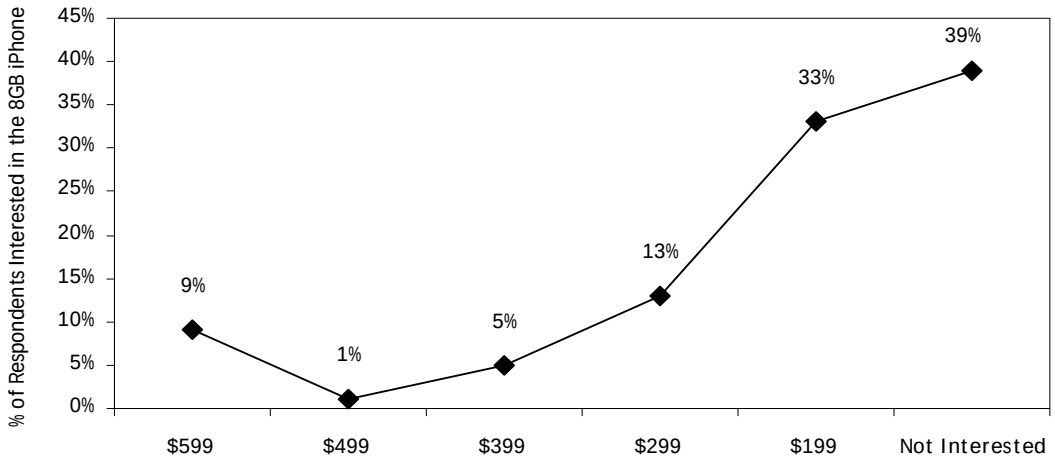
- **Iconic Smartphones / Designs.** History has shown iconic, disruptive innovations can accelerate market expansion and adoption. In 1981, the launch of the IBM PC accelerated the desktop computer market with its open architecture, PC-DOS and the ability to run third party applications (some included). Five years later, Netscape Navigator accelerated global web browsing with its superior user experience (on the fly web pages, cookies, frames, Javascript, etc) and "free" business model. Similarly, recently launched iconic Smartphones are helping accelerate global Smartphone adoption. Apple's iPhone in June 2007 disruptively raised the standard for a new kind of Smartphone design and user experience, breaking sales launch records, sparking competitive responses, and defying accepted conventions. Competitors quickly followed with launches of touch screen/ multimedia devices, including the LG Voyager, Samsung Instinct, Nokia 5800 XpressMusic 'Tube', Sony Ericsson XPERIA X1, HTC Touch, etc. RIM's touch screen "Storm", for example, combines the renowned Blackberry email/data experience with a consumer touch screen multimedia device.
- **International Opportunity: Expansion of Mobile Email and Browsing.** Data-centric Smartphone penetration outside North America is lagging (6.8% in Europe, 2.1% in Asia, 0.9% in the rest of the world – versus 11.3% in North America) – but this is likely to change. In our report ("Findings: The Unexpected Mobile E-Mail Explosion", April 8, 2008), a survey shows there are over 300 million users worldwide "experimenting" with mobile email. The survey (4,100 respondents, 18 countries) breaks this out as 17% of users in Western Europe (U.K., France, Spain, Germany and Italy), 12% in North America, 11% in China and 84% in Japan, suggesting a long term global opportunity beyond North America for data-centric Smartphones that offer email. SMS-centric users, who sent 2 trillion SMS messages and 26 billion MMS messages in calendar year 2007, represent a large opportunity for International Smartphone growth, as these users – already familiar with text entry – begin to seek to enhance their mobile experience beyond voice/SMS, to add mobile email and browsing, upgrading to Smartphones. International growth may also be assisted by the introduction of iconic Smartphones outside North America (iPhone, Blackberry Storm) along with lower cost, entry level and pre-pay Smartphone data plans aligned to local buyer preferences.
- **Buyer Mix-Shift.** A buyer mix-shift in phone markets towards people seeking user-friendly, media-centric experiences is also aiding Smartphone growth. While the traditional base has been business users and early consumer adopters, growing global adoption of mobile email, mobile browsing and mobile applications are expanding the Smartphone market into new segments (youth, students, mature users, women, small businesses, vertical markets, etc). These buyers are seeking the convenience and productivity of continuous connectivity for email, social networking, instant messaging, multimedia messaging (photo, video, etc), and fingertip access to information from mobile browsing, location based services, and anywhere/anytime multimedia downloads. Accordingly, a global replacement cycle is underway, as consumers move from voice-only phones and SMS usage, to Smartphones.

- **Faster Network Technologies.** Broadband 3G wireless networks (EV-DO Rev A, HSPA) paired with faster-processor handhelds, deliver faster and improved user experiences. For example, using 3G (HSPA) a user can download a high-resolution photo in approximately 1.2 seconds and a PowerPoint presentation (3MB) in 12 seconds, approximately eight times faster than EDGE networks. Deployments of 3G networks doubled from 153 globally in August 2006 to 328 operators in June 2008, representing more than 50% of global operators. Although still not seamless, AT&T's 3G network continues to roll out; it is scheduled to reach the top 350 metropolitan areas of the US by the end of calendar year 2008. T-Mobile USA is rolling out 3G, which is expected to reach 27 markets by December 2008. Many countries outside North America have already deployed early 3G networks, now widespread throughout Western Europe, Latin America, and parts of Asia-Pacific, with the exception of China, India, and parts of Asia and Africa who still operate on 2G networks. Many 3G Smartphones also feature Wi-Fi, with fast Wi-Fi "hotspots" now reaching more than 230k points of presence globally, up from 100k in Jan 2006. 4G networks like WiMAX (Sprint/Clearwire currently deploying in the US) and 4G LTE or Long-Term Evolution (commercial deployments may begin 2010) offer another leap in download speeds (up to an estimated 100Mbps versus. 1.8Mbps for HSDPA), promising a mobile user internet/data experience approaching that of cable internet and corporate networks. Verizon Wireless has already indicated it will support LTE as its 4G technology.
- **Carrier Wars Accelerate Smartphone Growth.** Similar to the Pepsi versus Coke wars of 1970s and 1980s – which raised soft drink consumption from 23 gallons/person in 1970 to over 40 gallons/person in 1985 – the intensifying global war between carriers for lucrative data subscribers is expected to expand the global consumption of mobile data (and thus data-centric Smartphones). For example the iPhone, available only at exclusive carriers in some regions (US, UK, Canada, France and Germany) has significantly intensified the carrier battle, with non-iPhone carriers aggressively moving to stave off subscriber losses and improve their data ARPU growth. The net benefit has been the increased launch/promotion of Smartphones across all carriers, along with increased subsidies (lower Smartphone prices), lower data service pricing, and compelling data applications (e.g. music/video stores). For example, Verizon raised subsidies (i.e. lowered pricing) on several Smartphones like the BlackBerry Pearl and Curve in August 2008, and will heavily promote the touchscreen BlackBerry Storm as an iPhone competitor. Sprint markets the touchscreen Samsung Instinct and the HTC Touch to customers attracted to the iPhone.
- **Mobile Applications Enhancing the Mobile Experience.** Mobile applications – when combined with faster networks and Smartphones – vastly enhance the mobile experience and broaden its appeal. This is particularly true in categories like mobile gaming, location-based applications, mobile messaging, social networking, multimedia, productivity, etc. Examples include applications like Google Maps, Facebook, Bloomberg, Yelp, Ticketmaster, Games (e.g. EA's Spore or Sega's Super Ball Monkey), Local Search (Restaurants, Hotels, etc.) and many other applications ... including ones which have not yet emerged. Also business applications like CRM, mobile/desktop integration, vertical apps like fleet tracking also benefit. Application Markets (like iTunes App Store or pending marketplaces from Google, Samsung, RIM and Microsoft) make it easier to find, purchase and download applications. Traction in mobile applications has until now remained limited (currently for example only 5% of mobile phone subscribers download games); however, it appears key elements may be moving into place to accelerate the development and proliferation of mobile applications, similarly to how the increase in music-enabled phones globally (now over 33% of phones shipped globally) has increased mobile music downloads ($108 million mobile music revenue in North America, $204 million in Western Europe in calendar year 2007, more than doubling from $57 million and $93 million in calendar year 2006).
- **OS/Platforms Becoming Standards.** Similar to how iconic software applications accelerated early PC-OS and PC momentum (e.g. VisiCalc for Apple II and Lotus 1-2-3 for IBM PC), we believe mobile applications comprise a critical catalyst for future growth of data-centric Smartphones and vendor dominance. Until recently, mobile phone applications did not mimic the vibrant third party applications marketplace associated with the PC or the PDA, partially because of carrier reluctance to open their networks and relinquish customer control, and also because phone OS (Operating System) vendors were fragmented and incompatible with each

other, and for various reasons could not entice a broad base of application developers to invest in their platform as a standard. As a result, Smartphone application platforms (Windows Mobile, Symbian, Palm, Blackberry, Linux, etc.) have been fragmented and no clear standard has emerged. Led by iPhone apps store and SDK, along with intensifying efforts from Google (Android) and others, RBC expects some of these OS's will dominate and consolidate to two or three, allowing sufficient scale to attract a critical mass of mobile application developers and users. Apple iPhone OS (Mac OS X kernel) is, in our view, a leading contender; Google Android, Palm "Nova", Windows Mobile and Blackberry have yet to achieve sufficient critical mass of compelling applications, while Symbian has gained a sizable developer following in Europe, but has failed to achieve similar presence in North America.

- **Device Pricing Moving to 'Sweetspot'.** Smartphone pricing has recently declined while simultaneously offering more features and capabilities, stimulating demand. Apple's introduction on July 11, 2008 of the iPhone 3G at $199 had a profound impact on Smartphone pricing, boosting iPhone purchase momentum estimated over 100%, and establishing a standard by which other Smartphones would be comparison shopped. On subsidized $199 pricing and international distribution, we estimate Apple will sell 14 million iPhones in calendar year 2008 and 23 million in calendar year 2009, up from 4 million in calendar year 2007. Other US carriers moved aggressively to match AT&T's iPhone pricing, e.g. LG Voyager now $99, down from $149, and Samsung Glyde now $79, down from $149, and T-Mobile G1 Android phone at $179, Samsung Instinct at $139 and Palm Centro at $99. The $199 (and below) price point has become "table stakes" for Smartphone vendors; April 2007 data from RBC IQ/Changewave Technology Panel (3,500 respondents) suggested 61% of respondents would buy the iPhone at $199, up more than four times from the 15% respondents that expressed interest at $399.

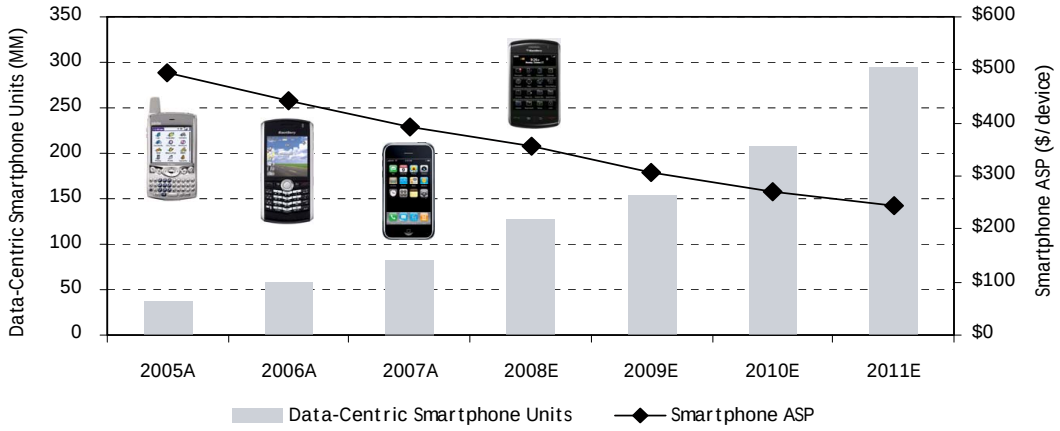
Exhibit 4. RBC IQ/Changewave Technology Panel (3,500 respondents): At What Price Would You Buy an iPhone?



Survey conducted April 2007; 3,500 respondents
Source: RBC Capital Markets/ChangeWave

- **Smartphone Wholesale ASP to Decline as Market Expands.** Our outlook calls for Smartphone wholesale pricing (to carriers before subsidies) to decline from an average $391 ASP in calendar year 2007 to $246 in calendar year 2011, down 11% CAGR. Mix shift to lower cost entry-level Smartphones (e.g. Palm Centro, BlackBerry Pearl Flip), expected to rise from 24% of Smartphone units in calendar year 2007 to 67% in calendar year 2011, along with passing through component price declines and cost engineering (e.g. lower priced high-end processors, LCDs/touchscreens, memory, 3G radios). Pricing of entry-level Smartphones is likely to decline faster, as they target more price conscious consumers along with emerging markets, whereas high-end Smartphone pricing is likely to be more resilient and decline at a moderate rate (e.g. 5% CAGR) given the need to incorporate cutting edge components and materials.

Exhibit 5. Smartphone ASP vs. Smartphone Unit Growth



Source: RBC CM Research

- **Lowered Pricing on Data Plans.** Previously only available at $100/month and up ($45-60/month for data (unlimited/5GB cap) atop a $40-50/month voice plan), high-cost carrier data plans were considered a large inhibitor to broad Smartphone adoption. In the past 24-months, carriers – driven by the "carrot" (potential market expansion) and "stick" (competitor pricing and consumer weakness) – have lowered data pricing, increased data limits, and introduced entry level data plans. For example, Verizon in 2005 cut unlimited data to $59 from $79, sparking competitor reductions, and subsequently (February 2008) introduced an entry level $39/month unlimited PC data plan (50MB/month). In Feb 2008, Sprint launched "Simply Everything" offering unlimited voice, text, data, GPS, Sprint TV for $99/month. In June 2006, Telecom Italia became the first carrier to introduce "Pay as You Go" pricing on Smartphones, where customers are only charged for data used. T-Mobile USA introduced the $9.99/month Unlimited E-Mail plan in September 2007. In October 2008, NTT DoCoMo reduced its i-mode data service fees from 4,095 yen/month ($38) to 1,029 yen ($10). Since the July 11, 2008 launch of the iPhone 3G, unlimited consumer data plans appear to be moving to the $30/month price point. Internationally, where prepay plans are popular (Italy is 89% pre-paid, Latin America is 83% pre-paid, UK is 65% pre-paid, Spain is 42% pre-paid), prepay Smartphone data plans are expected to have a similar effect, adopting local market conventions and appealing to more price-sensitive Smartphone shoppers.
- **Broader and Deeper Enterprise Adoption.** Smartphones will continue to get a boost as the mobilization of enterprises continues, as deployment of mobile email and enterprise applications expands beyond key executives to mobile professionals and ultimately many rank-and-file employees. RBC estimates there were 19 million business enterprise mobile email users globally in calendar year 2007, which is estimated to grow to 74 million by calendar year 2011 or 40% CAGR. Although mobile deployments may slow amidst a global recession, this may be somewhat offset by the productivity and ROI (Return on Investment) of mobile business email and desktop/mobile integration, as CIO/CTOs consider the competitive advantages and productivity gained from deploying Smartphones. As well, deployment of third party applications (SAP, Oracle, Microsoft, Bloomberg, Cognos, etc) and company applications – along with mobile VPN (remote network access) and mobile/PBX integration (desktop/mobile phone) offers the promise of 'mobilizing' the corporate desktop. IT manageability/security will remain a key IT requirement for corporate Smartphones, which in our view may continue to favor Research in Motion, but we also expect increased penetration in the enterprise by Microsoft via Windows Mobile and mobile features in Exchange Server. Apple's ActiveSync (Microsoft's protocol for wirelessly synchronizing data with Microsoft Exchange) for the iPhone is expected to assist traction for iPhone amongst business users – although principally in our view with individuals to SMEs, less with more security-conscious large enterprises. We expect the mobilization of more leading enterprise applications from Enterprise VARs like SAP, Oracle, Microsoft, etc. will continue, including enterprise resource planning applications (ERPs), customer relationship management (CRMs), sales force

automation (SFA), desktop applications, field service, document workflow and collaboration, vertical applications for various industries, etc.

Sizing the Smartphone Market

Conventional Definitions Inadequate. The Smartphone market can be potentially enormous, given 1.1 billion phones are shipped every year globally and there were 3.3 billion mobile phone users in 2007. Many conventional Smartphone market definitions include handsets sold without data plans or used solely for voice/SMS; for example, over an estimated 50% of Symbian devices (e.g. Nokia N78, N95, Sony Ericsson W950i, Motorola MOTORIZR Z8) and an estimated 20% of BlackBerry Pearls (at some carriers) are sold on a voice plus SMS plan with limited/no mobile data use. Conventional Smartphone market definitions in our view may overstate market size/growth, distort vendor rankings and competitive landscape and make it difficult to assess the reasonableness of vendor growth and market share estimates.

'Data-Centric' Smartphone Market. RBC's Smartphone market forecast excludes voice-only users and focuses on those users requiring data plans, dubbed "data-centric" Smartphone users. These are users who pay for data services (atop voice) such as wireless email, web browsing, applications (social networking, location services, video, etc), mobile music, video, etc, – and purchase Smartphones designed for that purpose – offering the ability to do data entry (from casual emailing on touch screens like iPhone or Blackberry Storm, to more frequent email, messaging, data entry on physical keyboards), browse the mobile internet (HTML not just WAP), personalize with third party applications (games, utilities, social networking etc.) and content utilizing mobile multimedia (video/music) and picture/video functionality. For enterprise users, data-centric Smartphones offer some QWERTY input (touchscreen and/or keyboard), offer a developer environment/SDK for corporate developers, and allow IT-approved integration with corporate messaging/data systems and applications.

Exhibit 6. RBC Data-Centric Smartphone User Definition

- **Carrier-supported data services** – to enable push mobile email, web browsing, content downloads, real-time weather and mapping, news updates, etc.
- **Hardware** – fast processor, 3G (HSPA and/or EV-DO) and Wi-Fi radios, high resolution screen, high capacity internal memory or SD card, high resolution camera with video, 3.5mm headset jack, GPS, Bluetooth, other sensors (accelerometer, ambient light), reliability, high quality voice features (voice-activated dialing, excellent sound quality, etc.), GPS for navigation-oriented buyers, long battery life and/or removable battery.
- **Style, fashion, form factor –** Thin, QWERTY, flip, slider, touchscreen, candybar, etc – as appropriate to buyer and geographic tastes.
- **Data-Centric Operating system** – stability/reliability, sleek UI, ease of use, powerful, personalizable, QWERTY input (touch screen and/or keyboard, etc), application integration/personalization; Security and manageability for corporate buyers/users.
- **Messaging/Data Capabilities** – integration with POP3, IMAP, OMA, popular consumer email platforms (Gmail, Hotmail, Yahoo Mail, AOL), also hosted messaging capabilities (e.g. BIS for Blackberry, Mobile Me for Apple), integration with popular enterprise messaging server platforms (Exchange, Notes, IMAP, POP3).
- **Multimedia/music/video experience** – powerful, elegant media players (audio and video), media formats (3gp, MP3, WMA, MIDI, AAC/AAC+/eAAC+, DivX, H.263, H.264, iTunes FairPlay) integration with popular jukeboxes / online stores (e.g. iTunes, Windows Media).
- **Developer Ecosystem –** traction with developer community, developer-friendly (SDK, conferences, support, etc), mechanism for deployment/QA (stores, etc), dominant ecosystem of third party apps and developers. Also corporate developer traction.
- **Application Marketplace –** Leading/convenient app download stores; momentum in critical apps such as PIM (contacts, calendaring, notes), IM, social networking, navigation, games, productivity apps (MS Office), news readers, Internet browser, multimedia player, enterprise apps, 1-click search/buy enablement.

- **Enterprise Features –** IT manageability/control; ROI and TCO leadership; IT level security; integration with popular enterprise apps (SAP, Oracle, Microsoft, BI, ERP).
- **Smartphone/Data service pricing** – $199 or less for consumer, $299 or less for bus/prosumer; Service data pricing $30 or less for mass market adoption.

Example Data-Centric Smartphones:

BlackBerry Bold

iPhone 3G

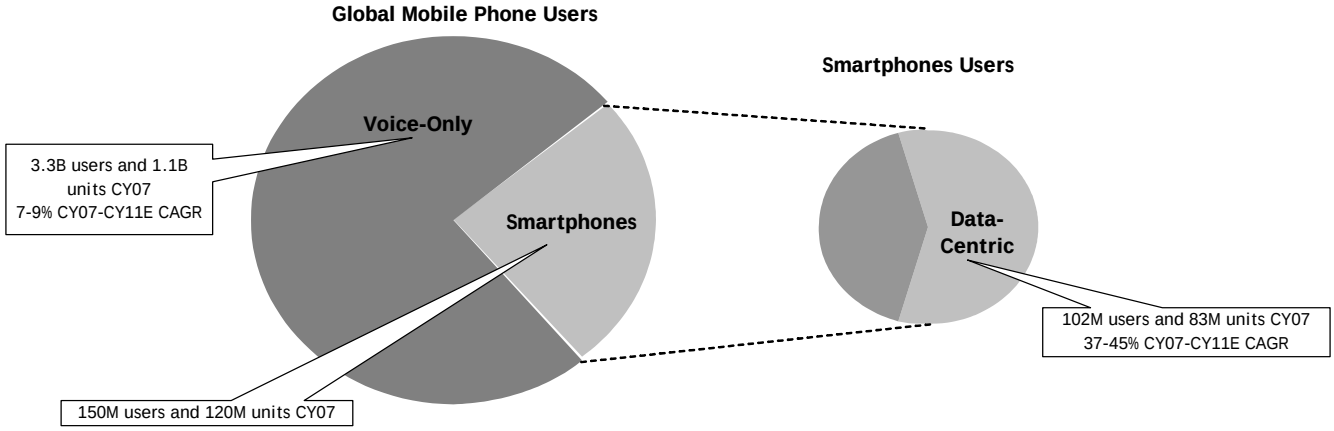
Nokia E71

HTC Dream / T-Mobile G1

Source: RBC Capital Markets

Using this definition, RBC has developed an independent global forecast for this market based on adoption of data-centric handheld devices by global region. Our outlook is smaller than conventional forecasts; however, the Data-Centric Smartphone market outlook grows faster, with higher revenue/user, and has higher entry barriers then market definitions.

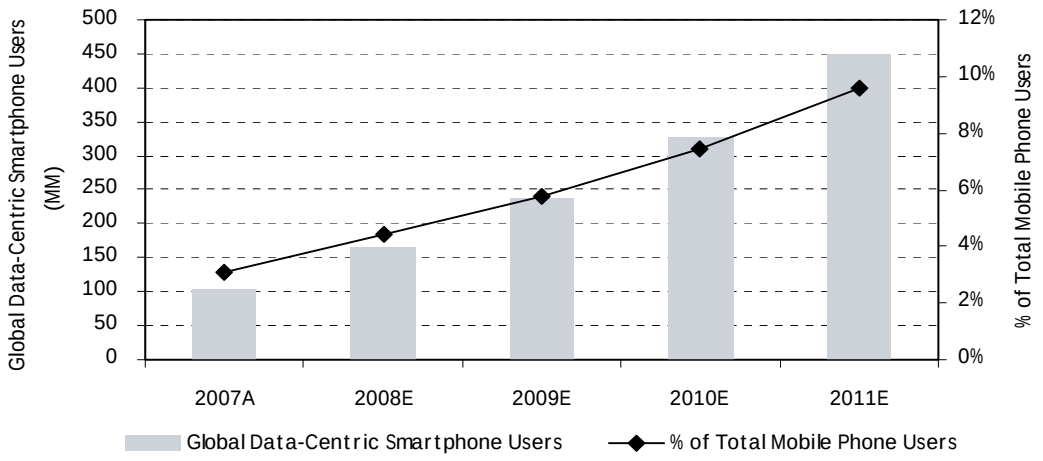
Exhibit 7. RBC Data-Centric Smartphone Market



Source: RBC CM Research

100 Million Global Data-Centric Smartphone Users Growing 60% CAGR. Using the aforementioned definition, RBC forecasts 165 million "data-centric" Smartphone users globally in calendar year 2008, growing to 449 million users by calendar year 2011 at 45% CAGR. RBC estimates "data-centric" Smartphone users will grow from 4.4% of all phone users in calendar year 2008 to 9.6% in calendar year 2011.

Exhibit 8. Global Data-Centric Smartphone User Forecast (MM)

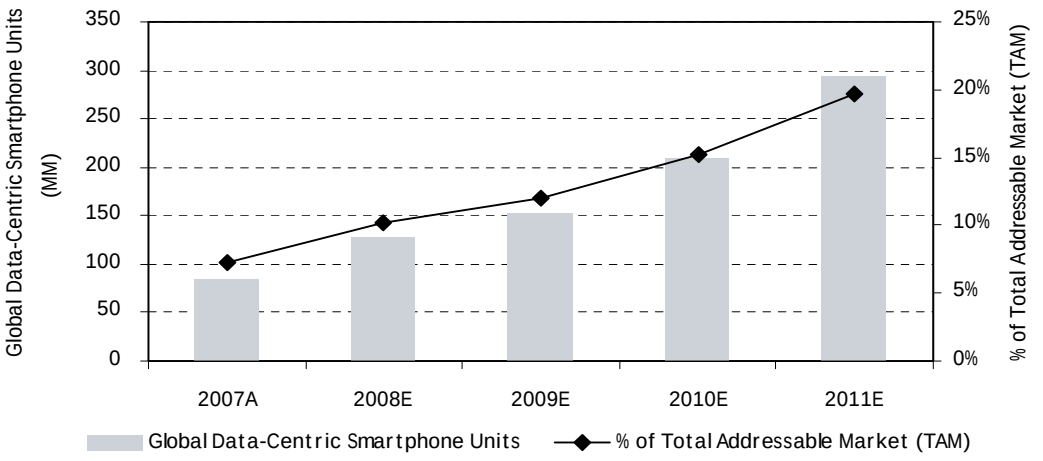


	2007A	2008E	2009E	2010E	2011E	CAGR
Global Data-Centric Smartphone Users	102.3	165.2	236.1	326.5	448.7	44.7%
% of Total Mobile Phone Users	*3.1%*	*4.4%*	*5.8%*	*7.4%*	*9.6%*	

Source: RBC Capital Markets Research

Data-Centric Smartphone Units to Rise to 20% of All Phones – Three Times Expansion. Under RBC's data-centric Smartphone definition, units shipped globally are expected to expand three times (37% CAGR) between calendar years 2008 and 2010, with 127 million expected to be sold CY08 (10% of Total Addressable Handset Market or TAM), rising to an estimated 294M units by CY11 (19.6% TAM) or 37% CAGR. Other growth areas include PC Cards and modem-embedded laptops (discussed later in this report). Our outlook is based on an 18-24 month replacement cycle – faster than the three to four years (average) in the mobile phone market; this assumption is based on the higher pace of Smartphone innovation (3G, GPS, digital cameras, media players, interfaces, form factors, etc), along with the growth of applications and proliferation of new designs and functionality. Our view is Smartphone buyers tend to upgrade faster than regular phone buyers since technological improvements (like 3G) provide more urgency to upgrade, and subsidies are greater, which make upgrades more affordable.

Exhibit 9. Global Data-Centric Smartphone Unit Forecast (MM)



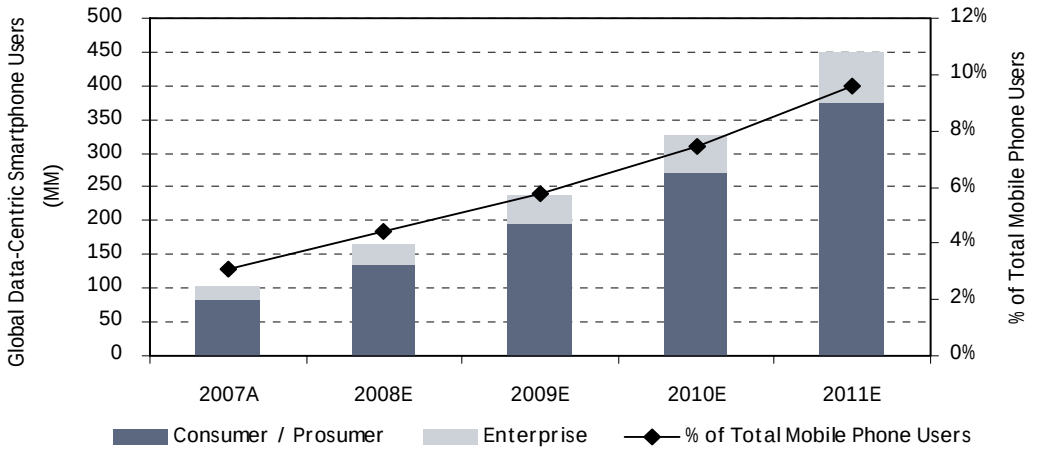
	2007A	2008E	2009E	2010E	2011E	CAGR
Global Data-Centric Smartphone Units	83.3	126.8	153.5	208.4	294.0	37.1%
% of Total Addressable Market (TAM)	*7.3%*	*10.2%*	*11.9%*	*15.2%*	*19.6%*	

Source: RBC Capital Markets Research

Consumer/Prosumer Versus Business Segments

Consumer/Prosumer Versus Business. The consumer/prosumer Smartphone market is expected to grow faster than the business market over the next four years and be five times as large. Out of 165 million total estimated data-centric Smartphone users globally in calendar year 2008, RBC estimates over 80% (136 million) are consumers/prosumers expected to rise to 375 million in calendar year 2011 (84% or total) at 46% CAGR. There were 19 million business data-centric Smartphone users (19% of total)--typically larger enterprises, SMEs and executives whose Smartphone useage is primarily business and whose service is often expensed-- in calendar year 2007, a group expected to rise to 74 million by calendar year 2011 (17% of total) or 40% CAGR. Our outlook calls for faster growth in consumer/prosumer data-centric users versus business users, given the larger size of the potential consumer market, favorable factors for consumer growth (pricing, applications, iconic devices, form factors, mix-shift from voice-only to smartphones, etc.) and international expansion, where consumers represent a larger portion of the market.

Exhibit 10. Consumer/Prosumer vs. Enterprise - Users

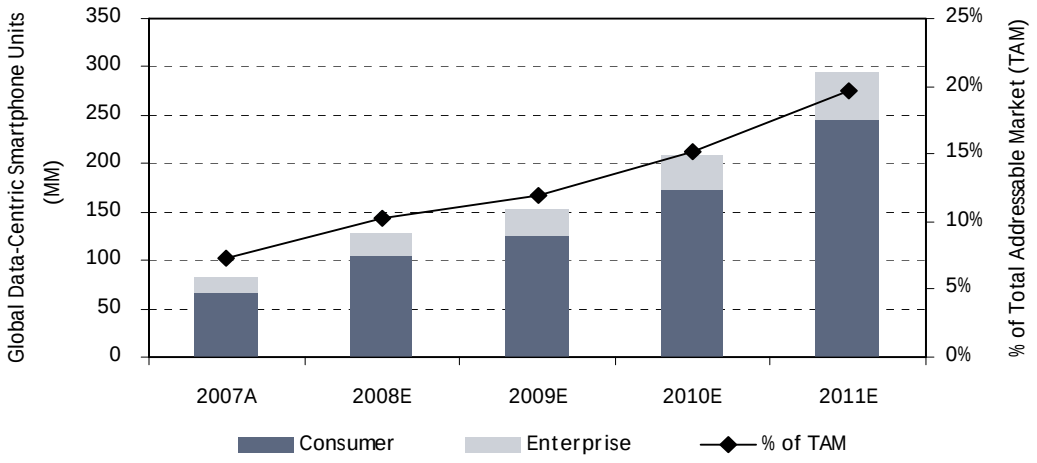


	2007A	2008E	2009E	2010E	2011E	CAGR
Consumer / Prosumer	82.9	135.5	194.8	271.0	374.6	45.8%
Enterprise	19.4	29.7	41.3	55.5	74.0	39.7%
Worldwide	**102.3**	**165.2**	**236.1**	**326.5**	**448.7**	**44.7%**
% of Total Mobile Phone Users	*3.1%*	*4.4%*	*5.8%*	*7.4%*	*9.6%*	

Source: RBC Capital Markets Research

On a unit basis, out of 127 million total estimated data-centric Smartphones units sold globally in calendar year 2008, RBC estimates 104 million (82%) data-centric Smartphones units are sold to consumers/prosumers and 23 million (18%) to business users. This is expected to rise to 246 million units sold (84%) to consumers by calendar year 2011 at 38% CAGR, or 49 million sold to business users (17%) or 32% CAGR.

Exhibit 11. Consumer/Prosumer vs. Enterprise – Units



	2007A	2008E	2009E	2010E	2011E	CAGR
Consumer / Prosumer	67.5	104.0	126.6	173.0	245.5	38.1%
Enterprise	15.8	22.8	26.9	35.4	48.5	32.3%
Worldwide	**83.3**	**126.8**	**153.5**	**208.4**	**294.0**	**37.1%**
% of Total Addressable Market (TAM)	*7.3%*	*10.2%*	*11.9%*	*15.2%*	*19.6%*	

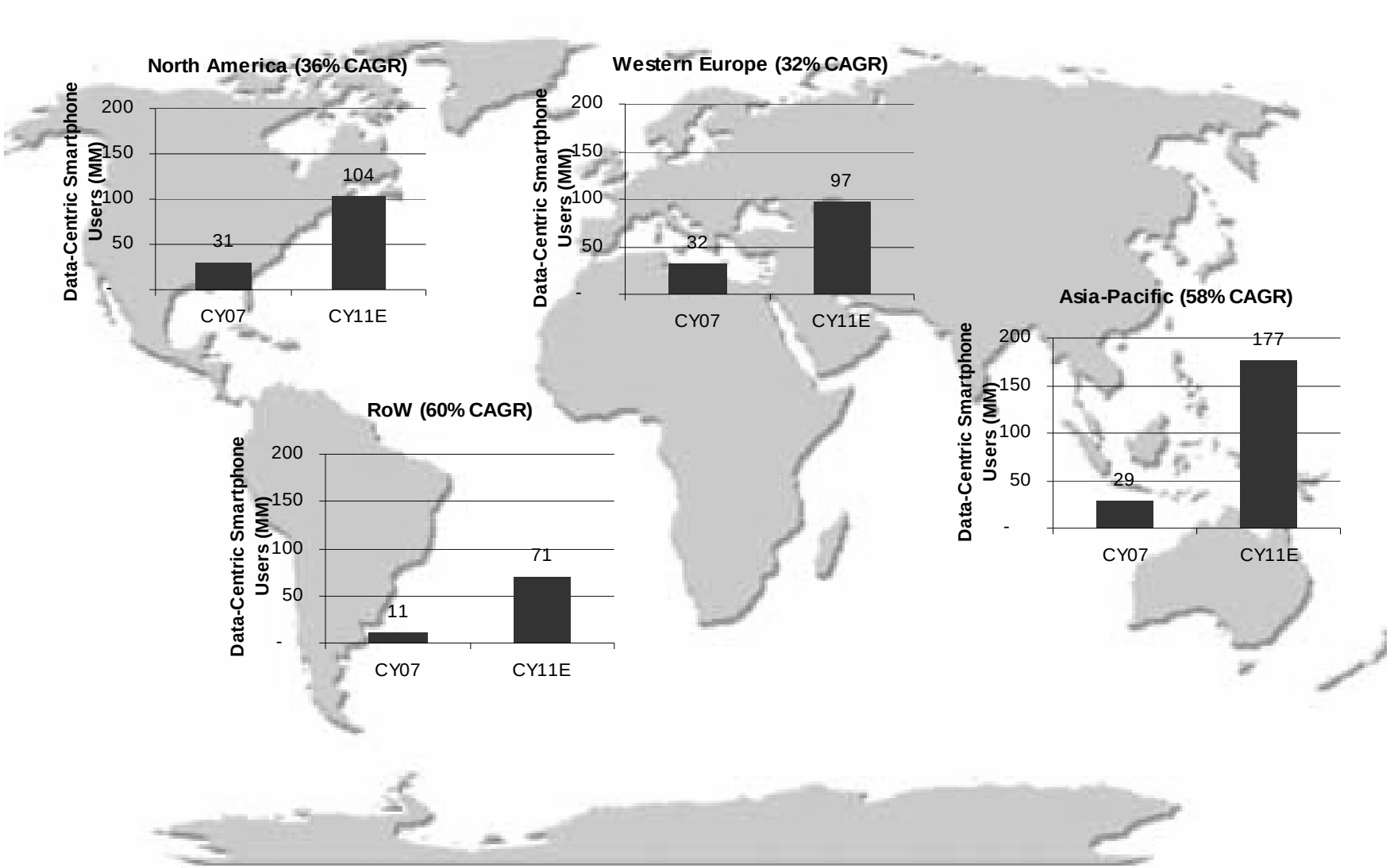
Source: RBC Capital Markets Research

International Smartphone Market

International Market User Forecast. We expect data-centric Smartphone market opportunity to rise globally, driven by:

1) Adoption of mobile email and mobile data/apps globally (possibly greater in emerging markets) – including over 300 million "experimenting" with mobile email in late calendar year 2007;
2) New 3G handsets designed to make emailing and browsing easier than current 3G offerings;
3) Introduction of lower cost, entry level and pre-pay Smartphone data plans aligned to local buyer preferences (e.g. in May 2008, Vodafone began bundling 500MB/month of data with monthly contracts above £25/month);
4) Introduction of iconic Smartphones (e.g. iPhone, Blackberry Storm, T-Mobile G1) into Europe and Asia, along with iconic phones with localized form factors (e.g. 'Slider' Smartphone with slide out keyboard, and touch screens);
5) Increased focus on data by international carriers (e.g. in May 2008, Vodafone began bundling 500MB/month of data with monthly contracts above £25/month, and the second quarter calendar year 2008 saw 29% organic year over year growth in mobile data revenue to £664 million, versus 1% organic decline in voice revenue and 2.5% growth in messaging revenue);
6) Pending expected EU regulations to reduce data roaming charges (following EU regulations to reduce voice roaming tariffs).

Exhibit 12. International Data-Centric Smartphone User Penetration (% of Total Mobile Phone Users)



Source: RBC Capital Markets Research

Exhibit 13. International Data-Centric Smartphone User Penetration (% of Total Mobile Phone Users) and Drivers

	2007A	2008E	2009E	2010E	2011E	CAGR	Adoption Drivers	Potential Adoption Inhibitors
North America								
Total Mobile Phone Users (MM)	273.0	296.2	316.4	334.7	352.5	6.6%	New innovative Smartphones; lower data pricing and subsidized device pricing; sustained introduction of innovative killer apps (e.g. Facebook, navigation) not available on mass market phones; HTC growth on Android shipments.	Consumer / Prosumer electronics spending slowdown; competition from mass market phones with 'good enough' social networking and messaging features.
Smartphone % of Mobile Phone Users	**11.3%**	**14.4%**	**17.4%**	**22.5%**	**29.5%**			
Data-Centric Smartphone Users (MM)	30.7	42.7	55.1	75.3	104.0	35.6%		
Western Europe								
Total Mobile Phone Users (MM)	478.1	498.6	514.6	529.5	543.8	3.3%	Greater awareness/distribution of BlackBerry and iPhone; new innovative Smartphones; lower data pricing; reduction in data roaming fees; introduction of innovative killer apps (e.g. Facebook) not available on mass market phones; Symbian maintains its market dominance, but faces some share losses against new players; improving HTC penetration on shipments of Android devices.	Consumer / Prosumer electronics spending slowdown; competition from mass market phones with 'good enough' social networking and messaging features.
Smartphone % of Mobile Phone Users	**6.8%**	**8.7%**	**10.5%**	**13.5%**	**17.9%**			
Data-Centric Smartphone Users (MM)	32.3	43.4	54.0	71.5	97.3	31.8%		
Asia-Pacific								
Total Mobile Phone Users (MM)	1,337.6	1,557.5	1,764.6	1,965.8	2,156.5	12.7%	Greater awareness/distribution of BlackBerry and iPhone; new innovative Smartphones; lower data pricing; mobilization of Asia-Pacific content and apps; sustained penetration of Symbian and HTC devices with data plans on compelling new smartphones (e.g. Nokia 5800 XpressMusic 'Tube', Nokia e71, HTC Dream) and other vendors.	Availability of Asia-Pacific content and apps; speed of Smartphone component cost reductions and introduction of low cost 'emerging markets' Smartphones; per capita income limitations.
Smartphone % of Mobile Phone Users	**2.1%**	**3.5%**	**5.1%**	**6.5%**	**8.2%**			
Data-Centric Smartphone Users (MM)	28.5	54.5	90.0	127.8	176.8	57.8%		
Rest of the World (RoW)								
Total Mobile Phone Users (MM)	1,204.9	1,360.7	1,480.4	1,572.2	1,639.8	8.0%	Greater penetration of MS Exchange and Lotus Notes for business users; lower data pricing and subsidized device pricing; use of Smartphones to replace Internet cafes; sustained penetration of Symbian and HTC devices with data plans on compelling new smartphones (e.g. Nokia 5800 XpressMusic 'Tube', Nokia e71, HTC Dream) and other vendors.	Availability of local region content and apps; speed of Smartphone component cost reductions and introduction of low cost 'emerging markets' Smartphones; per capita income limitations.
Smartphone % of Mobile Phone Users	**0.9%**	**1.8%**	**2.5%**	**3.3%**	**4.3%**			
Data-Centric Smartphone Users (MM)	10.8	24.7	37.0	51.9	70.5	59.9%		
Worldwide (% of Mobile Phone Users)	**3.1%**	**4.4%**	**5.8%**	**7.4%**	**9.6%**			

Source: RBC Capital Markets Research

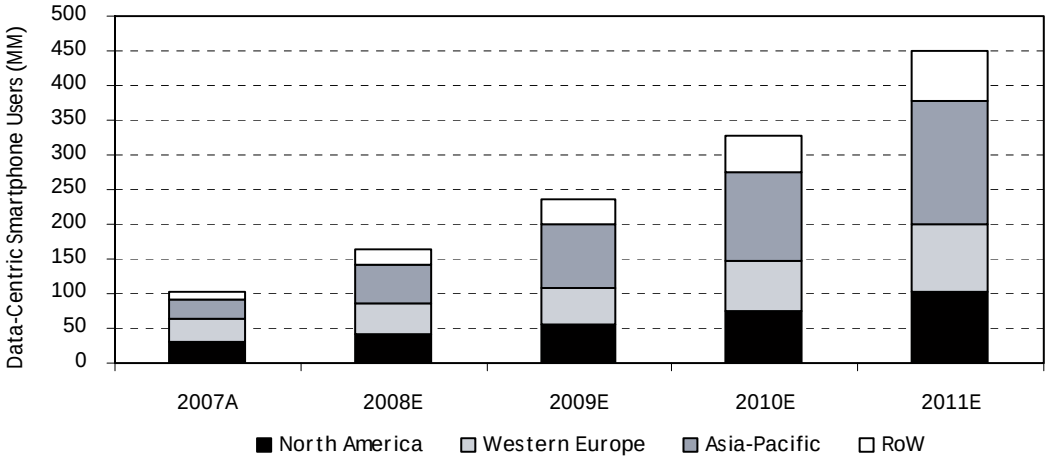
North America and Western Europe. Out of 165 million total estimated data-centric Smartphone users globally in calendar year 2008, RBC estimates there are 43 million data-centric Smartphone users in North America in calendar year 2008 (14% penetration), which are expected to rise to 104 million in calendar year 2011 (30% TAM) or 36% CAGR.

RBC estimates Western Europe data-centric Smartphone users at 43 million in calendar year 2008 (9% penetration), rising to 97 million in calendar year 2011 (18%), up 32% CAGR. Considered a leading indicator of data-centric Smartphone growth, Western Europe (U.K., France, Spain, Germany and Italy), was ranked at 17% of users "experimenting with mobile email" versus. 12% of users in North America.

Asia Pacific and Rest of the World Markets. Regions outside North America and Western Europe already account for an estimated 79 million data-centric Smartphone users in calendar year 2008 or 48% of total, but are expected to grow rapidly, reaching 247 million users or 55% of total data-centric Smartphone users by calendar year 2011, up 58% CAGR.

- RBC estimates Asia-Pacific (including Japan, China, Korea, India, Australia, New Zealand, Indonesia, Thailand, Singapore, others) at 55 million data-centric Smartphone users in calendar year 2008 (3.5% of 1.6 billion mobile phone subs), growing to 177 million users by calendar year 2011 (8% of 2.2 billion total subs), up 58% CAGR. An estimated 11% of mobile users in China and 84% in Japan were "experimenting" with mobile email, suggesting a strong emerging Asia-Pacific data-centric Smartphone opportunity.
- RBC estimates RoW (Rest of the World, including Latin America, Russia, Eastern Europe, Africa, Middle East) to grow from 25 million data-centric Smartphone users in calendar year 2008 (1.8% of 1.4B total subs) to 71 million by calendar year 2011 (4.3% of 1.6B total subs) or growing 60% CAGR.

Exhibit 14. International Data-Centric Smartphone Market Forecast – Users



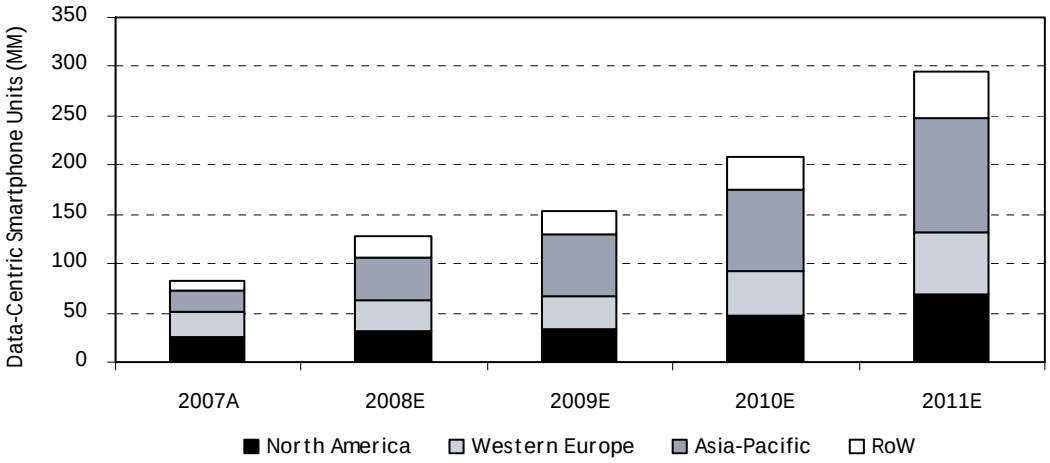
	2007A	2008E	2009E	2010E	2011E	CAGR
North America	30.7	42.7	55.1	75.3	104.0	35.6%
Western Europe	32.3	43.4	54.0	71.5	97.3	31.8%
Asia-Pacific	28.5	54.5	90.0	127.8	176.8	57.8%
RoW	10.8	24.7	37.0	51.9	70.5	59.9%
Worldwide	**102.3**	**165.2**	**236.1**	**326.5**	**448.7**	**44.7%**

Source: RBC Capital Markets Research

International Unit Shipment Forecast. Our outlook calls for North American data-centric Smartphone unit sales to rise from an estimated 31 million units in calendar year 2008 (18% of TAM), to 68 million units (40% of TAM), up 29% CAGR. In Western Europe, Smartphone units are expected to rise from 31 million units in calendar year 2008 (17% of TAM), to an estimated 64 million units in calendar year 2011 (36% TAM), up 25% CAGR. In Asia-Pacific we expect data-

centric Smartphone units to rise from 44 million in calendar year 2008, (9% of TAM) to an estimated 116 million units by calendar year 2011 (16% TAM), up 52% CAGR. In other regions (RoW), Smartphone units are expected to increase from 21 million calendar year 2008 (5% of TAM), to an estimated 46 million units by calendar year 2011 (11% TAM), up 46% CAGR.

Exhibit 15. International Data-Centric Smartphone Market Breakdown – Units



	2007A	2008E	2009E	2010E	2011E	CAGR
North America	24.9	31.1	33.7	47.8	68.3	28.7%
Western Europe	26.2	31.3	32.3	44.5	63.5	24.8%
Asia-Pacific	22.1	43.8	62.7	82.8	116.3	51.5%
RoW	10.1	20.6	24.7	33.4	45.9	45.9%
Worldwide	**83.3**	**126.8**	**153.5**	**208.4**	**294.0**	**37.1%**
% of Total Addressable Market (TAM)	*7.3%*	*10.2%*	*11.9%*	*15.2%*	*19.6%*	

Source: RBC Capital Markets Research

The Global SMS Opportunity. With 2 trillion SMS messages and 26 billion MMS message sent in calendar year 2007, mobile messaging is hugely popular, particularly outside North America. With average 112 SMS/year/sub sent in calendar year 2007, developing nations are the leaders in SMS, compared with 69 SMS/year/sub sent in calendar year 2007 in North America and 42 SMS/year/ sub sent in calendar year 2007 in Western Europe. This offers a large opportunity for Smartphone growth, as these users – already familiar with text entry – begin to seek to enhance their mobile experience beyond voice/SMS, to add mobile email and browsing, upgrading to Smartphones. This trend is already beginning; for example, RIM indicated in June 2007 that Latin America contributed 10% of its consumer sub adds in the first quarter of fiscal year 2008.

China, Korea, Japan: Huge but Tough to Crack. China (estimated half a billion mobile phone subs and adding approximately 100 million per year) remains an attractive long-term opportunity for data-centric Smartphones, but remains difficult to crack for some Smartphone manufacturers, due to:

a) Cheap knockoffs/counterfeits, with high percentage of ‘grey market’ devices; e.g. China Mobile’s 'Redberry' is a clone of RIM's Blackberry push email service at a fraction of the price; unlocked Apple's iPhones – minus warranty and some features – are commonly sold in China via the black market, fueled by iPhone fever there called "Ai Feng" ("Love Craze"), and many iPhones clones have come onto the market;

b) Favoritism, barriers and bias towards local solutions; for example, South Korea has remained largely closed to foreign phone manufacturers due to regulations mandating all mobile phones support Korea’s proprietary WIPI (Wireless Internet Platform for Interoperability) standard, which may in the future diminish, opening up the tech-savvy Korea market (estimated at 45 million subs) to foreign Smartphones;

c) Lower affordability (ARPU in China is approximately $11/month, versus $52/month in US).

d) Unique cultural differences. Japan is one of the earliest adopters of mobile internet, with more than 80% of estimated 100 million-plus mobile phone subs using mobile data services. The success of mobile data in Japan is primarily due to NTT DoCoMo's i-mode and KDDI's EZWeb. However, the few Windows Mobile devices that are available and recently the iPhone in Japan have struggled for growth, given local preferences for features like TV viewing and embedded chips enabling mobile payments.

Other Asia-Pacific Opportunity. Outside China, Korea and Japan, the Asia-Pacific market represents a large opportunity, including India (estimated 230 million subs), Indonesia (estimated 100 million subs), Thailand (estimated 50 million subs), Philippines (estimated over 50 million subs), Taiwan (estimated 24 million subs), Australia (estimated 22 million subs), Hong Kong (estimated 10 million subs), others. Data-centric Smartphone penetration in Australia and New Zealand is expected to be similar to North American and Western European trends, with relatively comparable levels of disposable income, interest in mobile services (email, IM, social networking, etc.), brand recognition (e.g. iPhone and BlackBerry), and recently in Australia, deployment and promotion of Telstra's 3G network. Smartphones are an attractive status item in other Asia-Pacific countries like Indonesia, Thailand, Philippines, Taiwan, Hong Kong, etc., with high sales of Symbian (e.g. Nokia N95 or N82) and Windows Mobile Smartphones featuring large digital cameras or robust media players. However, data-plan uptake in these regions significantly lags North America and Western Europe, given low disposable income, limited integrated services available on Smartphones and other factors. Smartphone penetration in Asia-Pacific is expected to rise over time, given the compelling services offered by Smartphones against the low wireline Internet access (e.g. eliminates the cost of using Internet cafes), along with competitive entry level data pricing.

Media-Centric Versus Productivity-Centric Smartphone Users

We see two primary segments within the data-centric Smartphone market: voice-centric, media-centric, and productivity-centric.

Media-centric users are data-centric users who, while still prizing data experiences and voice, primarily acquire a Smartphone for superior multimedia and content experiences. Media-centric users are attracted to data-centric Smartphones with powerful media players; music, movie and picture capabilities; seamless integration with third party multimedia stores (e.g. iTunes, RealNetworks Rhapsody, Napster, others); sufficiently available scope of music, movies, games, content available for the device; and a compelling "casual" web browsing experience. Personalization is prized by these users particularly for media-centric functionality, including support for third party consumer email platforms, IM, and web services. For personal entertainment and other experiences, these users prize powerful picture/video capabilities (high resolution camera, storage, applications, MMS, etc) and sufficient storage and battery life. Work-email integration is a consideration, but not a requirement, for these users. Media-centric users are satisfied with casual data entry (versus frequent email, messaging), willing to trade off speed and productivity (via a soft keyboard for example) for elegance and simplicity in multimedia usability and design, such as via a sleek UI and intuitive media player and web browser. Cost/pricing/features of multimedia features, applications and content along with related service costs, are key purchase requirements.

Productivity-centric users are data-centric users who still prize multimedia and voice, but are primarily interested in their Smartphone's data capabilities to improve personal productivity, more frequently using email, messaging, third party productivity apps than media-centric users, along with more purpose-driven web browsing (i.e. seeking information for productivity vs. casual surfing). Features such as PIM (calendar, contacts, notes) with wireless synchronization are more important to these users. Productivity-centric users seek speed and productivity for data entry and usage (such as offered by a tactile QWERTY keyboard or Blackberry Storm's clickscreen), are interested in the reliability/robustness/versatility of the Smartphone's messaging and PIM capabilities. Heavy email/messaging users may prefer a keyboard, which offers better tactile

feedback (e.g. for voicemail systems, form-filling, some Web use (e.g. typing URLs or searches or typing new phone #s)). Scope of content (music, movies, games) remains important but users are willing to accept 'good enough' (e.g. only AAC or MP3) as a trade-off for other productivity-centric advantages. Work-email integration is a requirement for these users as is integration with popular enterprise messaging and security standards, along with features like attachment viewing/editing. Phone reliability, serviceability and battery life are more important, as productivity-centric users depend more on their Smartphones to support their work-related needs along with play. Cost/pricing/features of productivity features, applications and content along with related service costs, is a key purchase requirement, with these users taking full data plans.

Exhibit 16. Smartphone User Market Segmentation: Media Centric vs. Productivity Centric

	Media-Centric	Productivity-Centric
		
Usage	• Casual data use (browsing, mobile email/messaging); 1-10 emails/day • SMS/MMS usage • PIM not necessarily connected • Mobile Entertainment (music, TV, movies) • Mobile web browsing • Third party apps – games, utilities, other	• Robust data use (browsing, mobile email/messaging, data entry); 10+ emails-day (up to hundreds) • SMS/MMS usage • Integration with mail servers (Exchange, Notes, IMAP, POP3, OMA, other) • Connected PIM (sync calendar, contacts, personal data) • Enterprise apps • Mobile web browsing • Information alerts
Consumer	• Teenager/student, gadget fan, music/TV/movie junkie, trendy consumers	• Busy student, parents, gadget fan
Business User	• Professional dealing with media content (e.g. graphic designer, music/TV/movie producer, actor), employee-owned device, SMBs	• Enteprise, Executive, professional at large enterprise or SMB, real estate agents, doctor, law enforcement, sales force
Importance of Device Features	• Multimedia player (MP3/AAC, video, FM radio, etc) • Picture viewing/browsing capability • High-resolution large screen • HTML browser (not just WAP) • Memory card slot or high-capacity integrated memory • High-resolution digital camera (2MP+) • Support for third-party apps • WiFi, Bluetooth, voice features	• QWERTY keyboard • Push data/messaging (email) • Integration with third party email and web services • Enterprise apps (CRM, ERP, etc.) • Large eco-system of third-party apps • HTML browser • Multimedia player (MP3, video, FM radio) • Removable battery • WiFi, Bluetooth, voice features
Preferred Form Factors	• Candy bar, flip, slider, QWERTY	• Candy bar, slider, QWERTY
Sample Devices	• Apple iPhone (unlocked, no data plan), Nokia N95, Nokia Tube, Sony Ericsson Xperia X1, LG Voyager, Samsung Instinct	• BlackBerry (Curve, Pearl, etc.), Nokia E71, Palm Treo (800w, 750, etc.), Motorola Q, Samsung BlackJack

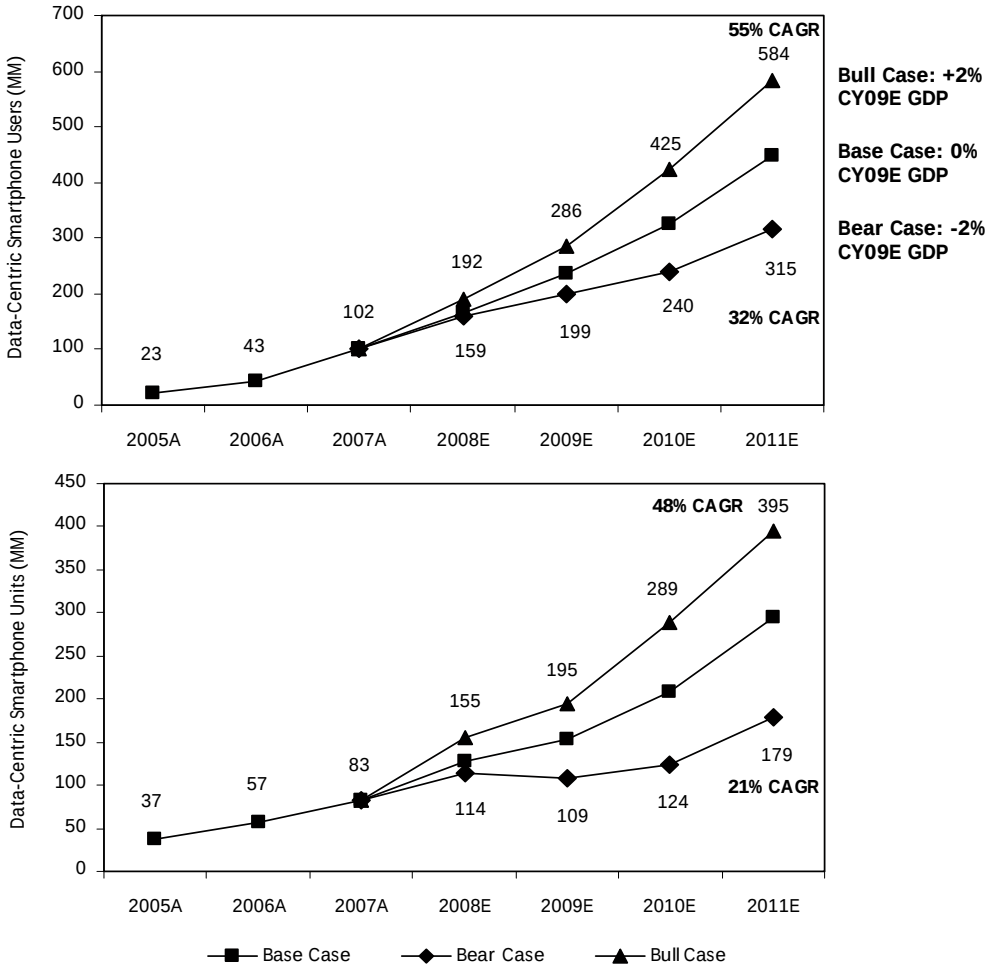
Source: RBC Capital Markets Research, Research in Motion, Apple

Smartphone Market Scenario Analysis

Product Cycle Versus Business Cycles. While the total global handset market remains vulnerable to global economic slowdown, and the data-centric Smartphone market (particularly the consumer segment) remains at risk from economic headwinds, RBC sees the data-enabled Smartphone market as a "market within a market", growing faster than the general handset market, for the following reasons: 1) new product cycles (handsets, applications, networks) and global transition from voice to Smartphones helps the Smartphone sector outperform the slowing economic cycle; 2) Smartphones appear less discretionary then other purchases; 3) the data-centric Smartphone market is international, with Smartphone growth within developing/emerging economies growing rapidly, offsetting slower regions; 4) lower data pricing and handset pricing trends are improving Smartphone affordability; 5) Smartphones are just beginning to penetrate broader market segments like SMBs, students, vertical markets, which helps offset weakness in traditional phone market segments; and 6) ROI of mobile deployments.

Smartphone Market Forecast Scenarios. Under three scenarios for economic growth/slowdown, our Scenario Analysis suggests 30% upside (Bull Case), 30% downside (Bear Case) to our data-centric global Smartphone user/unit Forecasts. The analysis shows Smartphone market growth ranging from 21-48% CAGR and handsets from 179 to 395 million calendar year 2011. Our scenarios (see Exhibit 17 and 18) vary assumptions on GDP, total mobile phone penetration and growth, Smartphone penetration and growth, Smartphone upgrade cycle. Our Bear Case assumes global recession, consumer and business spending contracts, with intensive competition; our Bull Case assumes stronger than expected global consumer uptake, discounted data/handset pricing, high emerging market demand, steady enterprise penetration.

Exhibit 17. Scenarios for Global Smartphone Penetration



Source: RBC Capital Markets Research

1. Base Case (RBC Forecast): Resilient Smartphone Uptake Within a Sluggish Economy. In this case, the US economy remains sluggish through calendar years 2008/2009, with GDP growth slowing to -1% in calendar year 2008 and 0% in calendar year 2009, with rising debt load, concerns about job security, and pessimism on home prices and stock markets restraining consumer spending. Adoption/replacement of mobile phones and upgrades to Smartphones, PC Cards/modules remains resilient on compelling new devices, new services/applications, lower pricing, enterprise ROI, and international growth. In this scenario data-centric Smartphone users grow from 102 million in calendar year 2007 to 449 million in calendar year 2011, or 10% of total mobile phone users, up 45% CAGR. Data-centric Smartphone handsets rise from 83 million in calendar year 2007 to 294 million in calendar year 2011, or 20% of TAM, up 37% CAGR, with replacement cycle slightly slowing to 2.0 years (from 1.8 years). Consumer/prosumer data-centric Smartphone users rise from 83 million in calendar year 2007 to 375 million in calendar year 2011 (84% of total), up 46% CAGR; enterprise users grow from 19 million calendar year 2007 to 74 million in calendar year 2011 (17%), up 40% CAGR.

2. Bear Case: Global Recession and Competitive Headwinds Hurt Smartphones. With intensifying pressures from rising debt load, tight credit, job losses and unemployment, and poor consumer confidence following collapses in home prices and stock markets, this scenario assumes a global recession, with US GDP growth declining to -2% in calendar year 2008 and remaining weak in calendar year 2009 at -2%, before slowly recovering in calendar years 2010/2011. International economies also slow on recessionary pressures – although not as slow as in the US.

Discretionary consumer spending contracts, with adoption/replacement of Smartphones, iPods, HDTVs, PC cards/modules etc. visibly slowing. Despite early positive indications, mobile email takes off more slowly outside the US than expected, offering a headwind to Smartphone traction. In this scenario, data-centric Smartphone users rise from 102 million in calendar year 2007 to 315 million calendar year 2011 or 7% TAM, up 32% CAGR. Data-centric Smartphone handsets rise from 83 million in calendar year 2007 to 179 million in calendar year 2011, or 14% of TAM, up 21% CAGR, with replacement cycle slowing to 2.3 years (from 1.8 years) as businesses reign in spending. With a pull back in consumer spending, consumer/prosumer data-centric Smartphone users are expected to grow from 83 million in calendar year 2007 to 263 million in calendar year 2011 (84% of total), up 34% CAGR; enterprise users reach 52 million in calendar year 2011 (17%), up 28% CAGR.

3. Bull Case: Smartphone Surprise. Although the US and global economy faces recessionary pressures (US GDP growth slowing to 0% in calendar year 2008, then recovering to over 2% in calendar year 2009), spending on Smartphones, PC data cards/modules remains resilient (market growth est 60-70% CAGR), driven by iconic new handsets (like Storm, iPhone) and form factors, lower data pricing, global carrier data promotions, 3G, compelling applications and international Smartphone acceleration, particularly in emerging economies. The resilience of global consumer discretionary spending on Smartphones and wireless data surprises investors, with higher than expected global replacement of voice phones, along with upgrades from older 2G to newer, faster, more full-featured 3G models. The Smartphone market globally also gets a boost, via adoption of mobile email and mobile browsing, particularly among new market segments (younger buyers, students, small businesses, vertical markets). Smartphone uptake also grows faster then expected within broader geographies (China, Russia, India, Western Europe, Latin America, etc). Our Bull case calls for data-centric Smartphone users to reach 584 million calendar year 2011, or 12% of total mobile phone users, up 55% CAGR. Data-centric Smartphone handsets rise to 395M CY11, or 24% of TAM, up 48% CAGR, with replacement cycle steady at 1.8 years on innovative devices and innovative service plans. On significant consumer uptake, consumer data-centric Smartphone users jump to 496 million in calendar year 2011 (85% of total), up 56% CAGR; enterprise users reach 88 million in calendar year 2011 (15%), up 46% CAGR.

Exhibit 18. Scenario Analysis

		2011E Outlook		
	2007A	**Bear Case**	**Base Case**	**Bull Case**
Assumptions:				
Global Mobile Phone Users (B) (CAGR)	3.3	4.4 (8% CAGR)	4.7 (9% CAGR)	4.9 (10% CAGR)
Global Mobile Phone Shipments (B) CAGR)	1.1	1.3 (4% CAGR)	1.5 (7% CAGR)	1.6 (9% CAGR)
Smartphone Penetration (% of TAM)	3.1%	7.1%	9.6%	12.0%
Smartphone Upgrade Cycle (Years)	1.8	2.3	1.9	1.8
Results:				
Data-Centric Smartphone Users (MM) (CAGR)	**102**	**315 (32% CAGR)**	**449 (45% CAGR)**	**584 (55% CAGR)**
Consumer / Prosumer	83	263	375	496
Enterprise	19	52	74	88
Data-Centric Smartphone Handsets (MM)	**83**	**179 (21% CAGR)**	**294 (37% CAGR)**	**395 (48% CAGR)**
Handsets % of TAM	7.3%	13.5%	19.6%	24.2%
Consumer / Prosumer	67	150	246	336
Enterprise	16	30	49	59

Source: RBC Capital Markets Research

Smartphone Vendor Share Outlook

Despite controlling over 80% of the global cellphone market, incumbent handset vendors are not expected to catch up to RIM's and Apple's success selling higher-end Smartphones with data plans (particularly in the US), setting the stage for share shifts away from the incumbent vendors to these faster-growing, more nimble Smartphone entrants. Incumbent vendors Nokia, Motorola, LG, Samsung, Sony Ericsson and others historically focused on offering mass market voice-centric feature phones, have responded by launching high-end voice-centric feature phones (with cameras or music, like Samsung's 7MP camera phone SCH-V770 or Nokia 8800 fashion/luxury phone) but have met with mixed reception to their Smartphone launches (waning post-launch momentum for Nokia N95/96, Motorola Q9, Samsung Blackjack 3G and Samsung Instinct). Accordingly we see traditional voice-centric phone shipments losing share to Smartphones, from 90% of TAM in calendar year 2008 to 80% in calendar year 2011 – while Smartphones are expected to gain share, with Smartphones moving from 10% of TAM in calendar year 2008 to 20% by calendar year 2011 at 37% CAGR. We estimate each 25bps global handset share gain (based on 1.2 billion calendar year 2008 total units) equates to additional 3 million units, or estimated $1.1 billion incremental revenue (at $357 ASP).

Exhibit 19. Incumbent Vendors Vulnerable

Incumbent vendor Smartphone offerings have met with mixed success; LG Prada and Voyager, HTC Diamond, and Samsung Instinct phones, for example, look 'iPhone-like', offering unique touchscreen interfaces with similar icon-based software with animations and fingertip control. Nokia's new E71 series handset comes packed with advanced Smartphone features in a thin form factor. The Motorola Q9 and Samsung Blackjack/SCH-i760 have been heavily promoted by AT&T, Verizon Wireless and others as Smartphones, priced attractively at $149 and $149 to $299. And all offer email and browsing.

Yet post-launch sales momentum of these models has waned, with mixed product reviews. Return rates are often higher on these incumbent Vendor Smartphones (versus iPhone or Blackberry, for example) because some users find them complex, unreliable or frustrating to use for email, browsing and other tasks.

Source: RBC Capital Markets Research

Vendor Share Shifts Expected. With their innovation and execution advantages in data-centric Smartphones, RBC forecasts Apple and RIM will continue to gain share from incumbent vendors Motorola, Nokia, LG, and Samsung – with HTC, Google Android, Windows Mobile, Palm as wildcards. With 1% of TAM (14% share data-centric Smartphones) in calendar year 2007, RIM need only achieve 1.8% of TAM in calendar year 2008 and 2.5% of TAM in calendar year 2009 to exceed RBC growth expectations in the next one to two years. Similarly, with 0.3% of TAM (4.4% share data-centric Smartphones), Apple need only achieve 1.1% of TAM in calendar year 2008 and 1.6% of TAM in calendar year 2009 to exceed RBC iPhone growth expectations in the next one to two years. HTC-branded (estimated 0.3% of TAM), Google Android and Windows Mobile Smartphones, and Palm, remain wildcards, each with up/down scenarios dependant on overcoming challenges, building competitive advantages, and successful uptake of pending product cycles.

New Entrant Advantages: End-to-End with Software. As opposed to vendors who only control either the hardware (Sony, HTC use Windows Mobile Software; Nokia uses Symbian which it owns now but remains a distinct entity), RIM and Apple design and develop both software and hardware, controlling the end-to-end wireless solution. This advantage – given continuous innovation in the wireless market – helps them deliver superior customer experiences (and in RIM's case superior carrier profitability) and sustain higher competitive barriers. These include superior user experience, battery life, reliability, carrier profitability, support, and time-to-market. Specific to Blackberry, its end-to-end model delivers higher spectrum efficiency, whose NOC and device/software work together to optimize user experience and minimize network congestion,

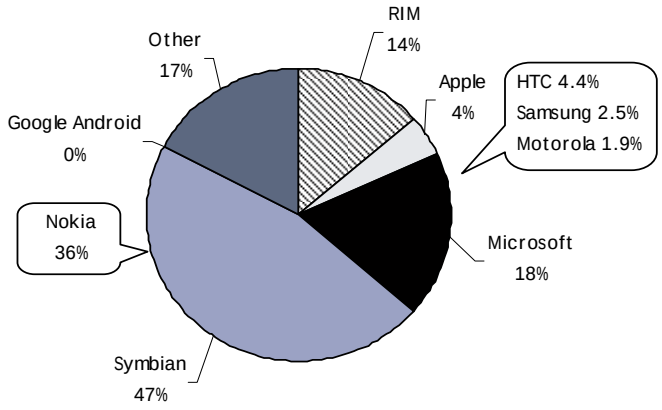
sustaining distribution leverage advantage and margins by offering superior carrier profitability. Apple and Google in our view also possess software advantages, in they have developed their Operating Systems as stripped-down versions of their PC-Class Operating Systems (Apple OSX and Google Linux) and loaded it on a mobile computer, establishing a new level for a mobile platform designed to expand, evolve and accommodate applications and content.

OS/Platforms Becoming Standards. Similar to how iconic software applications accelerated early PC-OS and PC momentum (e.g. VisiCalc for Apple II and Lotus 1-2-3 for IBM PC), we believe mobile applications comprise a critical catalyst for future growth of data-centric Smartphones and vendor dominance. Until recently mobile phone applications did not mimic the vibrant third party applications marketplace associated with the PC or the PDA, partially because of carrier reluctance to open their networks and relinquish customer control, and also because phone OS (Operating System) vendors were fragmented and incompatible with each other, and for various reasons could not entice a broad base of application developers to invest in their platform as a standard. As a result, Smartphone application platforms (Windows Mobile, Symbian, Palm, Blackberry, Linux, etc.) have been fragmented and no clear standard has emerged. Led by iPhone applications store and SDK, along with intensifying efforts from Google (Android) and others, RBC expects some of these operating systems will dominate and consolidate to two or three, allowing sufficient scale to attract a critical mass of mobile application developers and users. Apple iPhone OS (Mac OS X kernel) is in our view a leading contender; Google Android, Palm "Nova", Windows Mobile and Blackberry have yet to achieve sufficient critical mass of compelling applications.

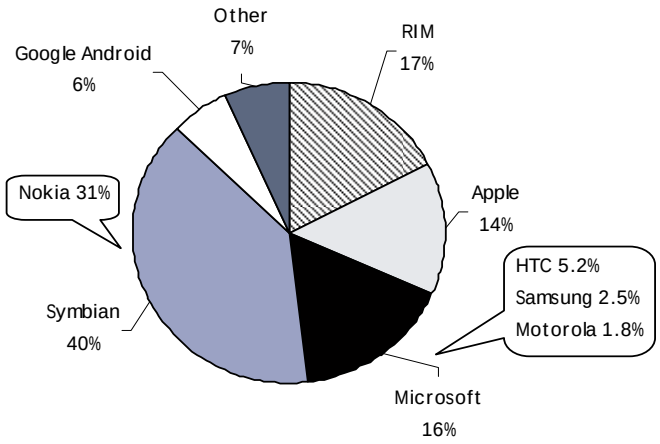
Vendor Share Outlook

Exhibit 20. Data-Centric Smartphone (Units) Vendor Share Outlook

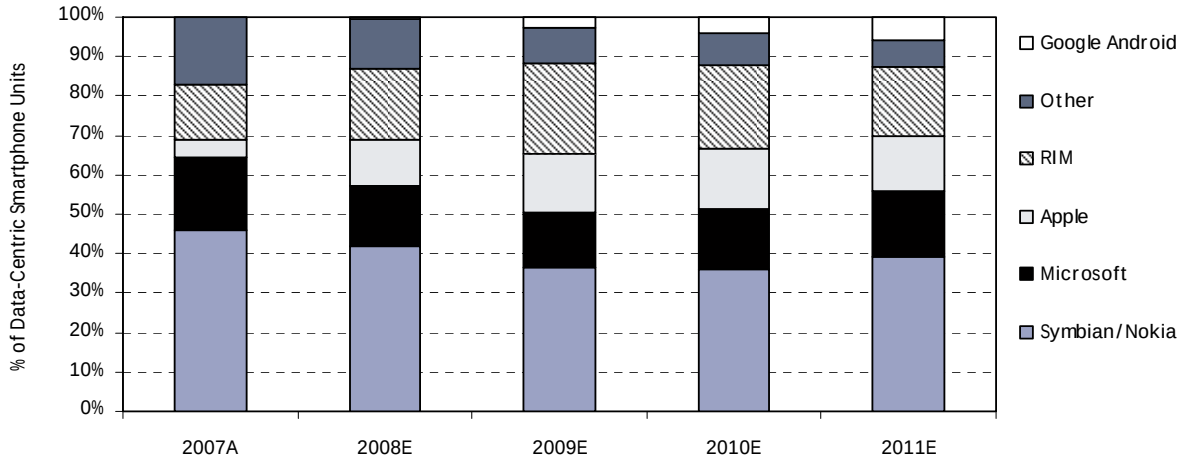
2007A Data-Centric Smartphone Share (Units)



2011E Data-Centric Smartphone Share (Units)



2007A-2011E Data-Centric Smartphone Share (Units) Shifts



Note: Other includes Palm OS in the chart.
Source: RBC Capital Markets Research

RIM Forecasted to Capture 3.1% TAM by Calendar Year 2011. From its early days launching a two-way pager running on the data-only Mobitex network in 1997, RIM has always had a superior messaging experience. RIM then evolved its OS into Java and launched massaging phones (along with the Curve, launched May 2007 and Pearl, launched September 2006), and now offers a wide portfolio of Smartphones globally, from prosumer to enterprise. Shipping 11.4 million handsets in calendar year 2007, RIM holds an estimated 13.7% of the data-centric Smartphone Market Share (shipments) or 1.0% of TAM, running on over 350 networks worldwide. Although vulnerable to recessionary headwinds, execution risks and margin pressures as it transitions to consumer, RBC expects continued growth, share gains versus incumbent vendors and product cycles to raise RIM's unit shipment market share to 18.3% of data-centric Smartphones handsets in calendar year 2008 and 23.1% in calendar year 2009, subsequently stabilizing at 21% calendar year 2010 and 17% calendar year 2011. This growth includes consumer handsets like the BlackBerry Storm and the flip phone Kickstart and Javelin (next gen Curve) along with other form factors. Apple's iPhone, along with launches of competitive devices like the Sony Ericsson's Xperia X1, T-Mobile G1, Nokia 5800 XpressMusic 'Tube', Nokia e71, are not expected to erode BlackBerry's trademark productivity-centric user experience, given RIM's control of its own software stack sustains its advantages in spectrum efficiency, battery life, latency (speed) and user experience, along with carrier profitability.

Exhibit 21. RIM as % of Forecasted Market, 2007A-2011E

	2007A	2008E	2009E	2010E	2011E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5	208.4	294.0
RIM Unit Forecast	**11.4**	**23.2**	**35.5**	**44.5**	**51.1**
% Data Centric Smartphone Units	13.7%	18.3%	23.1%	21.3%	17.4%
% TAM (units)	1.0%	1.8%	2.5%	2.9%	3.1%
RBC Data-Centric Smartphone Users (MM)	102.3	165.2	236.1	326.5	448.7
RIM Total Subscribers	**12.2**	**22.1**	**36.5**	**55.6**	**76.5**
% Data Centric Smartphone Users	11.9%	13.4%	15.5%	17.0%	17.1%
% of Total Mobile Phone Users	0.4%	0.6%	0.9%	1.3%	1.6%

Source: RBC Capital Markets Research

Apple to Capture 2.5% Global Share by 2011. The iPhone launch in January 2007 was hugely disruptive to the data-centric Smartphone market, with its multi-touch touchscreen and sleek UI, and since then has sold more than 13 million units. In July 2008, Apple launched iPhone 3G at $199, allowed subsidized pricing, diminished carrier exclusivity, and supported pay as you go and other carrier sales models, which have accelerated momentum and expanded its global addressable market. Competitors have struggled to introduce smartphones matching the iPhone's sleek touchscreen experience, robust third party applications platform, and tight multimedia integration. Although vulnerable to recessionary headwinds and not invulnerable to competition, RBC expects continued growth, share gains versus incumbent vendors and product cycles to raise Apple's unit shipment market share to 11.4% of data-centric Smartphones handsets in calendar year 2008 and 14.6% in calendar year 2009, subsequently at 15.2% in calendar year 2010 and 14.1% in calendar year 2011.

Apple's SDK and third party applications dramatically expand the appeal and value of the iPhone, helping establish/maintain its competitive advantages and sustain market leadership/growth. For example, Game developers are offering marquee games (e.g. EA's Spore or Sega's Super Ball Monkey) on the iPhone, to extend the popularity of their products, leverage interest in the game, and showcase the iPhone's unique user interface. In only four months of availability, users have already downloaded more than 200 million applications from Apple's App store. Our long-term outlook reflects upside from possible additional iPhone SKUs (including a possible entry level, low cost, <$99 subsidized, prepaid iPod/phone (voice only)) to capture an untapped global opportunity and establish future iPhone upgrades.

Exhibit 22. Apple as % of Forecasted Market, 2007A-2011E

	2007A	2008E	2009E	2010E	2011E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5	208.4	294.0
Apple Units Forecast	**3.7**	**14.4**	**22.4**	**31.6**	**41.6**
% Data Centric Smartphone Units	4.4%	11.4%	14.6%	15.2%	14.1%
% TAM (units)	0.3%	1.1%	1.6%	2.1%	2.5%
RBC Data-Centric Smartphone Users (MM)	102.3	165.2	236.1	326.5	448.7
Apple User Forecast	**3.7**	**17.4**	**34.4**	**51.7**	**69.8**
% Data Centric Smartphone Users	3.6%	10.5%	14.6%	15.8%	15.6%
% of Total Mobile Phone Users	0.1%	0.5%	0.8%	1.2%	1.5%

Source: RBC Capital Markets Research

Windows Mobile 7 May Regain Momentum. Windows Mobile is Microsoft's mobile OS, powering Smartphones from handset partners such as HTC, Motorola, Samsung, Palm, HP, ASUS, E-TEN, i-mate, Sony Ericsson. Although Windows Mobile achieved 18.4% share in calendar year 2007 due to its early lead, Windows Mobile has struggled versus RIM or Apple due to usability and stability issues, as well as failing to attract a critical mass of consumer app developers, and thus remains a wildcard with up/down scenarios dependant on overcoming its challenges, narrowing competitive gaps and winning back momentum with pending product cycles. In calendar year 2008, Microsoft missed its 20 million cumulative Windows Mobile objective (end of June calendar year 2008), shipping only 18 million units, owing to later than expected launches of innovative devices (e.g. HTC Touch Diamond, Sony Xperia X1), along with share losses against RIM and Apple on low reliability/stability, languishing developer interest and awkward Windows 'Start-button' -oriented UI. Our outlook calls for Windows Mobile to reach 15.6% of data-centric Smartphones handsets in calendar year 2008 and 14.2% in calendar year 2009, subsequently at 15.4% in calendar year 2010 and 16.4% in calendar year 2011.

Microsoft will attempt to address its competitive gaps against the iPhone and others with the release of Windows Mobile 7 expected late calendar year 2009. In the Enterprise, Microsoft is expected to continue to make share gains as it improves the security, reliability of its offerings.

Exhibit 23. Microsoft as % of Forecasted Market, 2007A-2011E

	2007A	2008E	2009E	2010E	2011E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5	208.4	294.0
Microsoft Units Forecast	**15.3**	**19.8**	**21.8**	**32.1**	**48.2**
% Data Centric Smartphone Units	18.4%	15.6%	14.2%	15.4%	16.4%
% TAM (units)	1.3%	1.5%	1.6%	2.1%	2.9%
Microsoft Vendor Shipments (MM)					
HTC-Branded	3.7	5.6	6.5	9.9	15.4
Samsung	2.1	2.7	3.1	4.7	7.2
Motorola	1.6	2.1	2.3	3.4	5.2
Palm	1.2	0.7	0.9	1.6	2.4
Others	6.7	8.7	8.9	12.4	17.9
RBC Data-Centric Smartphone Users (MM)	102.3	165.2	236.1	326.5	448.7
Microsoft User Forecast	**20.0**	**27.3**	**35.4**	**49.8**	**71.8**
% Data Centric Smartphone Users	19.5%	16.5%	15.0%	15.3%	16.0%
% of Total Mobile Phone Users	0.6%	0.7%	0.9%	1.1%	1.5%

Source: RBC Capital Markets Research

Android (Google) – The New Kid in the Hall. In Nov 2007, Google announced 'Android', a new mobile phone software platform/stack along with the Open Handset Alliance, a group of 34 partners. Similar to the Internet, Google aims to open mobile networks to standardized devices capable of running open software and third party applications. If it can gain developer and user momentum, Android has the long term opportunity to take market share, in our view; our outlook calls for Google to reach 0.4% of data-centric Smartphones handsets in calendar year 2008 and 2.5% in calendar year 2009, subsequently at 4% calendar year 2010 and 6% calendar year 2011.

There are many Google handsets expected to be released, the first of which is the T-Mobile G1 manufactured by HTC, at $179 with $25/month unlimited data plan. With its personalizeable user interface, touchscreen/ keyboard, mobile browsing, launch applications (Google maps, Gmail, IM, Amazon, etc.), the G1's initial reviews appear positive, but has design/feature gaps versus iPhone (e.g., design and form factor) and BlackBerry (e.g., messaging, carrier profitability). Similar to Apple's App Store, Google is introducing Android Market to maximize distribution and uptake of Android third party applications. Android has the opportunity to leverage Google's 100 million-plus online base, mobile application ecosystem/distribution (including Google Marketplace), open source development platform, advertising-oriented business model, and software innovation. Significant challenges remain, however, as Android's application deployment, hardware features/pricing, carrier distribution/relationships, wireless experience (certification, SDK) and advertising model remain new and immature. Though Android may be compelling, in our view it remains very early in formation and may face hurdles, and is late entering into a crowded market just when the global economy is slowing. Given initial limitations (including its form factor and bias to Gmail), we do not expect the G1 to make major initial strides against Apple or RIM, but Google in time is expected to improve its offering and attract third party developers and content partners to its platform.

Exhibit 24. Google Android as % of Forecasted Market, 2007A-2011E

	2007A	2008E	2009E	2010E	2011E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5	208.4	294.0
Google Android Units Forecast	**0.0**	**0.5**	**3.8**	**8.3**	**17.6**
% Data Centric Smartphone Units	0.0%	0.4%	2.5%	4.0%	6.0%
% TAM (units)	0.0%	0.0%	0.3%	0.5%	1.1%
RBC Data-Centric Smartphone Users (MM)	102.3	165.2	236.1	326.5	448.7
Google Android User Forecast	**0.0**	**0.5**	**4.0**	**9.7**	**20.9**
% Data Centric Smartphone Users	0.0%	0.3%	1.7%	3.0%	4.7%
% of Total Mobile Phone Users	0.0%	0.0%	0.1%	0.2%	0.4%

Source: RBC Capital Markets Research

Nokia: Defending Market Position. Nokia's Smartphones run Symbian OS, an open source mobile operating systems, formerly controlled by Ericsson, Nokia, Motorola and Psion. With more than 200M handsets shipped to date featuring its OS and 64% share of the overall Smartphone OS market, Symbian is the most popular Smartphone OS. However, we estimate over 50% of Symbian users don't fall under our data-centric definition, which implies usage of full data (browsing, email, apps) and excludes those without full data plans, and as such Symbian comprises only an estimated 46% of the data-centric Smartphone market in calendar year 2007. Our outlook calls for Symbian-powered handsets at 116 million shipments in calendar year 2011 (39% data-centric Smartphone market, 7.0% of TAM), versus from 53 million in calendar year 2008 (41.7%). Symbian's growth recently slowed, dropping to 5% year-over-year unit growth in the second quarter of calendar year 2008 on saturation in Asia/Pacific and Japan. We expect Symbian's growth to pick up in the second half of calendar year 2008 and calendar year 2009 as Nokia deploys Symbian to a greater proportion of its handsets, customer adoption of data plans for Symbian devices increases, and uptake of Nokia's pending innovative Smartphones like the touchscreen Nokia 5800 XpressMusic 'Tube', the all-in- one Nokia N96, navigation-oriented Nokia 6210, and the sleek Nokia e71. Nokia's acquisition of the remaining portion of Symbian in June 2008 and reorganization into the Symbian Foundation, an Open Source organization, may help unify Symbian's user experience and application development, which is currently fragmented across various UIs (S60 for Nokia devices, UIQ for Sony Ericsson and Motorola, MOAP for NTT DoCoMo handsets from Fujitsu, Sony Ericsson, Mitsubishi, Sharp, others). This duplicate development and low economies of scale has limited the innovation and investment in Symbian, which now lacks in user experience versus Apple and RIM. In adopting an Open Source model and unifying the platform, Symbian may better appeal to other handset vendors (e.g. Motorola, Samsung, LG, others) and defend its market position as an independent platform for other vendors in addition to Nokia. Applications developed for Nokia's S60 platform and Symbian 9 will remain compatible with the next-gen Symbian. Next-gen Symbian may or may not be integrated with Nokia's Ovi services platform, for syncing contacts, calendars, notes, photo/video sharing, and as a portal for Nokia's music store, N-Gage games downloads, map downloads, etc. Handsets based on next-gen Symbian OS are expected late calendar year 2009 / early calendar year 2010.

Exhibit 25. Symbian as % of Forecasted Market, 2007A-2011E

	2007A	2008E	2009E	2010E	2011E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5	208.4	294.0
Symbian Units Forecast	**38.4**	**52.9**	**55.8**	**75.0**	**115.5**
% Data Centric Smartphone Units	46.1%	41.7%	36.3%	36.0%	39.3%
% TAM (units)	3.3%	4.1%	4.0%	4.9%	7.0%
Symbian Vendor Shipments (MM)					
Nokia	29.9	42.4	44.7	60.1	92.6
Sony Ericsson	1.6	2.1	2.2	2.8	4.4
Others	6.9	8.5	8.9	12.0	18.5
RBC Data-Centric Smartphone Users (MM)	102.3	165.2	236.1	326.5	448.7
Symbian User Forecast	**46.0**	**70.2**	**90.9**	**122.4**	**170.5**
% Data Centric Smartphone Users	45.0%	42.5%	38.5%	37.5%	38.0%
% of Total Mobile Phone Users	1.4%	1.9%	2.2%	2.8%	3.6%

Source: RBC Capital Markets Research

Too Early to Call if Palm's Next-Gen OS Will Be a Success. As the developer of its legendary PDAs, Palm has a storied past, with lead management leaving the company to form Handspring in 1998 which subsequently launched its first Smartphone in 2002 (Treo 90), before being acquired by Palm in 2003. Since then, Palm has struggled with corporate restructurings (including divesting and losing control of the Palm OS to ACCESS in 2005), launched devices based on Windows Mobile in 2005, suffered poor device reliability/stability, let its Smartphone design stagnate, and failed to keep pace with growth in the Smartphone market. Recently Palm found a Smartphone niche with its aggressively priced (<$99 subsidized) Centro, selling 2 million cumulative units July 2008 in only 10 months since its launch, appealing to new Smartphone buyers like gen-x and gen-y (young professionals and parents, teenagers, others). The Centro is positioned as a full featured Smartphone (mobile email, browsing, Facebook, mobile TV, etc. in a sleek form factor with QWERTY keyboard) at an affordable price. However, Centro's sales momentum recently began slowing as competitive pricing has come down and Centro lacks the sleekness and user experience of new devices – including the iPhone and upcoming BlackBerries. Revitalized following its recapitalization with Elevation Partners which bought in former Apple executive Jon Rubenstein, Palm is planning on launching devices based on its next -gen "Nova" OS in the first half of calendar year 2009. Our outlook assumes Palm (based on Palm OS and next-gen "Nova" devices) achieves some recovery, moving from 2.2% data-centric Smartphone shipment market share or 1.8 million units in calendar year 2007 (0.2% of TAM), to 2.6% share in calendar year 2008 or 3.3 million units (0.3% of TAM) and 2.9% share in calendar year 2011 or 8.5 million units (0.6% of TAM). While the reputation of ex-Apple product guru Jon Rubenstein and his team are excellent, we remain cautious given visibility remains limited to how 'Nova' will leap ahead of competitive offerings from Apple, RIM, Google, Sony, Nokia, others. It is too early to determine whether Palm's next-gen OS code-named Nova will achieve widespread market penetration outside Palm's core market, along with Palm overcoming prior execution challenges such as slipped device launches, poor carrier distribution, and the failure to commercially launch the prior next-gen version of Palm OS (Cobalt). Nova is expected to be based on Linux and deliver a differentiated user experience, significantly improving usability of the Internet and web-based applications in a mobile device. With the UI designer for the Sidekick and Helio (easy to use consumer devices), the new OS is rumored to feature an 'iPhone-like' UI and has been called 'stunning' by Palm CEO Colligan. Palm's Windows Mobile line is expected to be reinvigorated on innovative designs like the Treo Pro which features thin form factor, 3G, WiFi, long battery life; our outlook calls for 2.4 million Windows Mobile units in calendar year 2011, up from 0.7 million calendar year 2008.

Exhibit 26. Palm OS as % of Forecasted Market, 2007A-2011E

	2007A	2008E	2009E	2010E	2011E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5	208.4	294.0
Palm OS Units Forecast	**1.8**	**3.3**	**4.1**	**6.1**	**8.5**
% Data Centric Smartphone Units	2.2%	2.6%	2.6%	2.9%	2.9%
% TAM (units)	0.2%	0.3%	0.3%	0.4%	0.6%
RBC Data-Centric Smartphone Users (MM)	102.3	165.2	236.1	326.5	448.7
Palm OS User Forecast	**2.6**	**4.2**	**5.5**	**7.9**	**11.2**
% Data Centric Smartphone Users	2.6%	2.5%	2.3%	2.4%	2.5%
% of Total Mobile Phone Users	0.1%	0.1%	0.1%	0.2%	0.2%

Source: RBC Capital Markets Research

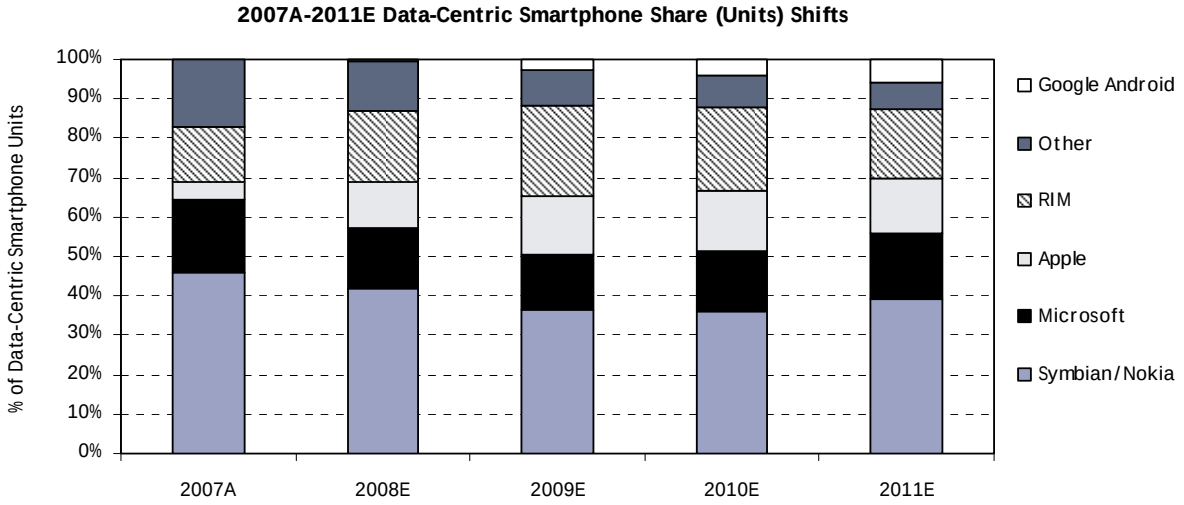
Other Platforms (e.g. Linux) to Decline to <10%. Other mobile platforms include Linux and proprietary platforms like Sidekick. Linux is popular in Japan where NEC and Panasonic offer FOMA smartphones devices for NTT DoCoMo (e.g. Panasonic P906i, and NEC N906i), and in some Asia-Pacific countries where Motorola offers its MING Smartphone. Our outlook calls for Other mobile platforms (Linux, other proprietary like Sidekick) to decline to 4% share of data-centric Smartphone users calendar year 2011 (11 million shipments), down from 15% share calendar year 2007 (13 million shipments). We expect mobile Linux and proprietary platforms to grow slower than the Smartphone market, given the maturity of Linux-based Smartphones in Japan. Mobile Linux may become popular as a low cost Smartphone platform for emerging markets, though no leading Linux implementation has emerged, and some vendors may increasing adopt open or established platforms like Symbian, Android, or Windows, and no longer justify the cost of maintaining another platform.

Exhibit 27. Other Platforms as % of Forecasted Market, 2007A-2011E

	2007A	2008E	2009E	2010E	2011E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5	208.4	294.0
Other Units Forecast	**12.6**	**12.7**	**10.2**	**10.8**	**11.4**
% Data Centric Smartphone Units	15.2%	10.0%	6.6%	5.2%	3.9%
% TAM (units)	1.1%	1.0%	0.8%	0.8%	0.8%
RBC Data-Centric Smartphone Users (MM)	102.3	165.2	236.1	326.5	448.7
Other User Forecast	**17.8**	**23.5**	**29.4**	**29.3**	**28.0**
% Data Centric Smartphone Users	17.4%	14.2%	12.5%	9.0%	6.3%
% of Total Mobile Phone Users	0.5%	0.6%	0.7%	0.7%	0.6%

Source: RBC Capital Markets Research

Exhibit 28. Data-Centric Smartphone Vendor Share Forecast, by Platform



Units and Share (MM)	2007A	2008E	2009E	2010E	2011E
RIM	11.4	23.2	35.5	44.5	51.1
% Data Centric Smartphone Units	*13.7%*	*18.3%*	*23.1%*	*21.3%*	*17.4%*
% TAM (units)	*1.0%*	*1.8%*	*2.5%*	*2.9%*	*3.1%*
Apple	3.7	14.4	22.4	31.6	41.6
% Data Centric Smartphone Units	*4.4%*	*11.4%*	*14.6%*	*15.2%*	*14.1%*
% TAM (units)	*0.3%*	*1.1%*	*1.6%*	*2.1%*	*2.5%*
Microsoft	15.3	19.8	21.8	32.1	48.2
% Data Centric Smartphone Units	*18.4%*	*15.6%*	*14.2%*	*15.4%*	*16.4%*
% TAM (units)	*1.3%*	*1.5%*	*1.6%*	*2.1%*	*2.9%*
Google Android	0.0	0.5	3.8	8.3	17.6
% Data Centric Smartphone Units	*0.0%*	*0.4%*	*2.5%*	*4.0%*	*6.0%*
% TAM (units)	*0.0%*	*0.0%*	*0.3%*	*0.5%*	*1.1%*
Symbian/Nokia	38.4	52.9	55.8	75.0	115.5
% Data Centric Smartphone Units	*46.1%*	*41.7%*	*36.3%*	*36.0%*	*39.3%*
% TAM (units)	*3.3%*	*4.1%*	*4.0%*	*4.9%*	*7.0%*
Palm OS	1.8	3.3	4.1	6.1	8.5
% Data Centric Smartphone Units	*2.2%*	*2.6%*	*2.6%*	*2.9%*	*2.9%*
% TAM (units)	*0.2%*	*0.3%*	*0.3%*	*0.4%*	*0.6%*
Other	12.6	12.7	10.2	10.8	11.4
% Data Centric Smartphone Units	*15.2%*	*10.0%*	*6.6%*	*5.2%*	*3.9%*
% TAM (units)	*1.1%*	*1.0%*	*0.8%*	*0.8%*	*0.8%*

Note: Other includes Palm OS in the chart.
Source: RBC Capital Markets Research

Business Smartphone Share Outlook

Microsoft and RIM to Remain Dominant. With business users, we foresee RIM's superiority sustained with Microsoft gaining share despite the onslaught of competitors vying for the business market, including iPhone, Symbian and Android. Our outlook calls for Microsoft's share of the business data-centric Smartphone user market to rise to 34% in calendar year 2011 (25 million users), versus 31% in calendar year 2007, gaining share from other platforms (e.g. Palm OS, Linux, proprietary), as Microsoft closes security and IT manageability gaps with BlackBerry with the release of Windows Mobile 6.1 and Mobile Device Manager in calendar year 2008. Our outlook calls to RIM to retain market leading 37% in calendar year 2011 share of the enterprise data-centric Smartphone user market, though down from 41% in calendar year 2007, given Microsoft's rising presence and the increasing competitiveness of other platforms targeting businesses (e.g. iPhone in SMB, Android). RIM's enterprise advantages include tight IT integration, distribution leverage through carriers and ISVs, device and user experience, install base advantage and brand recognition. We see iPhone reaching 9% share of the business data-centric Smartphone user market calendar year 2011, primarily SMBs with lower requirements on security, manageability, integration with enterprise apps, and support and willingness to put up with a touchscreen over a QWERTY keyboard.

Exhibit 29. Data-Centric Smartphone Business Share, by Platform

Business Users	2007A	2008E	2009E	2010E	2011E
RIM (MM)	8.0	12.4	17.5	22.3	27.5
% Data Centric Smartphone Business Users	41.3%	41.7%	42.4%	40.1%	37.2%
Microsoft (MM)	6.0	8.7	12.4	17.4	25.1
% Data Centric Smartphone Business Users	30.8%	29.3%	30.0%	31.4%	33.9%
Symbian (MM)	3.2	4.6	5.7	8.0	10.7
% Data Centric Smartphone Business Users	16.6%	15.3%	13.9%	14.3%	14.4%
Apple (MM)	0.0	0.9	2.4	4.7	7.0
% Data Centric Smartphone Business Users	0.0%	2.9%	5.8%	8.4%	9.4%
Google Android (MM)	0.0	0.0	0.2	0.6	1.3
% Data Centric Smartphone Business Users	0.0%	0.0%	0.5%	1.0%	1.7%
Others (MM)	2.2	3.2	3.1	2.6	2.5
% Data Centric Smartphone Business Users	11.4%	10.7%	7.4%	4.7%	3.3%
Total Data-Centric Business Users (MM)	**19.4**	**29.7**	**41.3**	**55.5**	**74.0**

Source: RBC Capital Markets Research

Smartphone Market Forecast: Implications

Positive Implications for RIM, Apple for 4 reasons: 1) large opportunity: e.g. RIM (Sector Perform, Above Average Risk, $46.58) currently has less than 1% global handset share; 2) Positioning. End-to-end messaging/data solutions (i.e. they control both OS & hardware) like Apple (Sector Perform, Above Average Risk, $95.88) and RIM, are expected to gain share versus incumbent handset or pureplay software competitors due to superior user experience and carrier support; 3) fiercely loyal customers and addictive user experience; and 4) individual advantages (e.g. for RIM, broad product line across pricepoints/technologies, reliable, secure, simple/powerful handsets, NOC, global distribution and carrier leverage) (e.g. for Apple, brand, mobile, compelling software/hardware user experiences; design edge, iTunes/iPod install base, PC/iPod halo effect).

RIM only needs to exceed an estimated 1.9% of TAM in calendar year 2008 (18.3% data-centric Smartphone handset share) and 2.8% of TAM in calendar year 2009 (23.1% data-centric Smartphone handset share) to meet RBC expectations – which appears to us achievable, even with the presence of Symbian, Apple, Microsoft, Google and other competitors.

Exhibit 30. RIM vs. RBC Required Market Share, 2007A-2009E

	2007A	2008E	2009E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5
RBC RIM Unit Forecast	**11.4**	**23.2**	**35.5**
Required Data-Centric Smartphone Share (%)	13.7%	18.3%	23.1%
% TAM (units)	1.0%	1.9%	2.8%

Source: RBC Capital Markets Research

Apple needs to exceed an estimated 1.2% of TAM in calendar year 2008 (11.4% data-centric Smartphone handset share) and 1.7% of TAM in calendar year 2009 (14.6% data-centric Smartphone handset share) to meet RBC expectations – which appears to us achievable, even with the presence of Symbian, RIM, Microsoft, Google and other competitors.

Exhibit 31. Apple vs. RBC Required Market Share, 2007A-2009E

	2007A	2008E	2009E
RBC Data-Centric Smartphone Units (MM)	83.3	126.8	153.5
RBC Apple Unit Forecast	**3.7**	**14.4**	**22.4**
Required Data-Centric Smartphone Share (%)	4.4%	11.4%	14.6%
% TAM (units)	0.3%	1.2%	1.7%

Source: RBC Capital Markets Research

Other Vendor Implications. In our view, **Microsoft** needs to address UI shortcomings against competitive devices; if Microsoft enters the Smartphone fray with its own, end-to-end device (similar to its Zune strategy), Microsoft will need to ensure that Windows Mobile offers a sufficient platform for third party vendors to differentiate their hardware, otherwise running the risk of alienating hardware licensees. For **Nokia/Symbian**, we believe the next-generation Symbian OS must embrace multi-touch, feature an updated UI, introduce a back-end services delivery platform to integrate not only into Nokia's OVI services, but also third party and carrier services, and appeal to other hardware vendors to sustain its market dominance. For **Google/Android**, we believe Android must adequately balance mobile operators and vendors flexibility to customize devices and UIs, with the need to ensure that the devices deliver an innovative user experience against more tightly integrated offerings from RIM, Apple and others. With vendor and operator flexibility, Android needs to ensure that developer applications function seamlessly on devices from various vendors on different operators. For **Palm**, its next-gen OS and devices will need to deliver a sufficiently differentiated and innovative user experience versus competitive devices. Perhaps more challenging, Palm needs to materially improve device reliability/stability and rebuild damaged carrier relationships (which suffered under high customer returns of past devices).

Mobile Content and Applications

The Mobile Content and Applications Market Is Still Early and Underpenetrated. The mobile content and applications market is only just beginning to emerge following the launch of the iPhone App store and popularity of innovative applications for BlackBerries (e.g. like Facebook). We see the pace of innovative mobile applications accelerating given: 1) burgeoning customer demand for mobile versions of desktop and web-based applications; 2) increasing popularity of constantly-connected activities like IM, social networking, blogging, location-based services; 3) availability of high-end developer tools; 4) lower prices of unlimited mobile data plans; 5) greater carrier acceptance of third party apps versus unsuccessful 'walled garden' approaches; and 6) growing availability of third party DRM-free multimedia stores. In our view, content and applications available for Smartphones now matches, or in some cases, eclipses (in the case of personal navigation) the functionality of full-featured PCs. Specific areas of mobile content and applications include:

- **IM, Social Networking.** In our view, applications like instant messaging, social networking, and blogging are the killer apps that will likely drive consumer Smartphone penetration. Instant messaging platforms like Windows Live Messenger, AIM, and Yahoo! Messenger which allow users to chat, share files/pictures, video conference, and other features have achieved widespread penetration, attracting more than 400 million active users. Only launched in 2003/2004, social networking sites like Facebook and MySpace where users maintain profiles/web pages, photo albums, chat, share videos have already gained significant popularity, with more than 200 million users internationally and on niche sites. The increasing prominence and use of IM and social networking sites to communicate and coordinate with friends is raising the pressure and need for consumers to maintain continuous connections with IM and social networking platforms. Although some traditional mobile phones are integrated with large IM platforms and social networking sites, we believe only Smartphones with data plans can offer a satisfying user experience where a large number of platforms are supported and users can complete make use of mobile features like photo uploads, location awareness, status updates. For example, more than 1 million BlackBerry users or almost 20% of BlackBerry consumer users have downloaded the mobile Facebook application, only five months since its launch.
- **Personal Navigation.** Personal navigation for smartphones with built-in GPS is another significant driver of Smartphone adoption. Navigation increases the appeal of Smartphones as a "converged" device, with users able to justify a Smartphone purchase for replacing a standalone GPS device. Examples include free mapping applications like Google Maps or BlackBerry Maps to paid turn-by-turn navigation apps like TeleNav GPS Navigator or Garmin Mobile. Smartphones go beyond simple maps, with innovative applications which integrate users' current location with searches for restaurants, attractions, geo-tagged photos, social networking and other applications.
- **Games and Productivity Applications.** Though not as significant a driver of consumer uptake like IM, social networking or personal navigation, games, productivity applications, and news readers round out the Smartphone experience. With large developer ecosystems, Smartphone platforms attract large, innovative developers, which may launch mobile versions of popular games and applications. Well-known games like Guitar Hero, Pac-Man, Super Monkey Ball, news readers for popular sites like CNNmobile or CNBC, and multitudes of productivity applications like dictionaries, tip calculators, expense trackers and many others attract consumers to the Smartphones.
- **Browsing, Multimedia and Mobile Content.** With availability of 3G devices and wider deployments of 3G networks, we believe browsing, multimedia and other mobile content will remain driver for Smartphone uptake and data service plans. In addition to mobile content (TV shows, movies, songs, ringtones) available from carriers, Smartphones like the iPhone and BlackBerry's Bold are able to directly download YouTube videos and mobile apps. Rich Smartphone browsers are able to properly display full HTML websites, replicating a desktop-grade user experience. The Smartphone browsing experience is so satisfying that some users may justify terminating broadband connection for their PC.

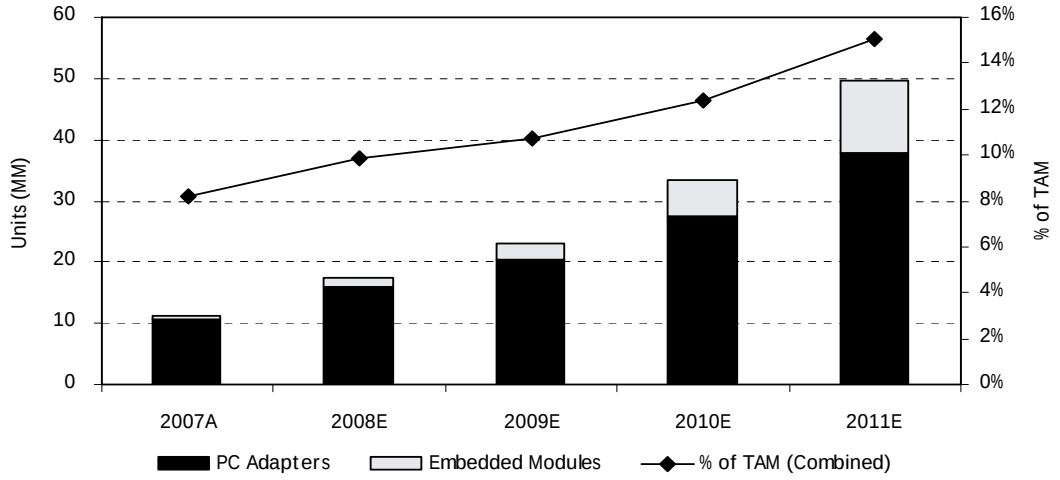
- **Enterprise Applications.** Today, messaging, mobile email, browsing and PIM, including calendars, contacts, tasks, etc., are the most commonly deployed applications on a mobile device. The growing number of employees with mobile devices is creating a need for the mobilization of enterprise applications such as ERPs (including applications like SAP or Oracle), CRMs (like Salesforce.com or Siebel), SFAs, desktop applications, field service applications, etc. These applications are becoming an integral component of business workflow and mobile employees are at a disadvantage if they cannot access data remotely.

Wireless-Enabled Laptop Forecast

Growth Despite Economic Slowdown. Amidst the global economic slowdown, RBC views the mobile broadband market similar to smartphones – while not recession-proof – as a 'Market within a Market', because: 1) mobile broadband delivers productivity gains and cost savings for mobile employees; 2) mobile broadband speeds approaching wireline speeds, driving replacements; 3) the market is international, with developing economies offsetting slower regions; 4) lower pricing trends improve affordability.

Expect Penetration to Double to 17% of All Mobile PCs. Although we expect growth to slow to 31% year over year in calendar year 2009 (from 56% year-over-year in calendar year 2008), we expect PC adapters and embedded module shipments to rise from 11 million in calendar year 2007 or 8% of TAM (Total Addressable Mobile PC Market, 267 million install base in calendar year 2007) to 50 million in calendar year 2011 or 17% of TAM, four times market expansion (45% CAGR). Lower priced service plans, sustained availability of subsidized devices, broader and faster 3G network deployments (increasing speed, coverage, reliability) are expected to drive further enterprise penetration and accelerate consumer wireline broadband replacements/augmentation. Enterprise penetration is expected to rise from 7% in calendar year 2007 to 13% in calendar year 2011; consumer penetration is expected to jump from 0.5% in calendar year 2007 to 2.5% in calendar year 2011. Our outlook is based on three-year replacement cycle.

Exhibit 32. Mobile Broadband Penetration

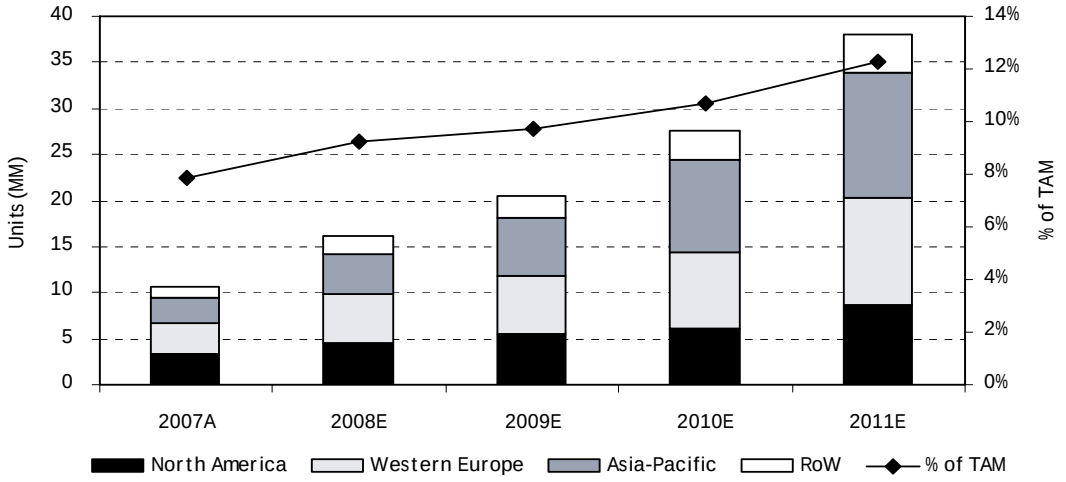


Source: RBC Capital Markets Research

With integration of Qualcomm's Gobi (multi-mode embedded modem, which overcomes carrier certification and network incapability challenges) and Ericsson's low-cost HSPA module into wide number of laptop platforms available in calendar year 2009, we see embedded modem shipments jumping from 0.5 million units in calendar year 2007 to 2.6 million in calendar year 2009E and 12 million in calendar year 2011E (up 115% CAGR). Embedded modems are expected to rise from 0.5% in calendar year 2007 to 4.7% of TAM (% of annual laptop shipments) in calendar year 2011. Availability of laptops is expected to slow uptake of discrete PC adapters slow

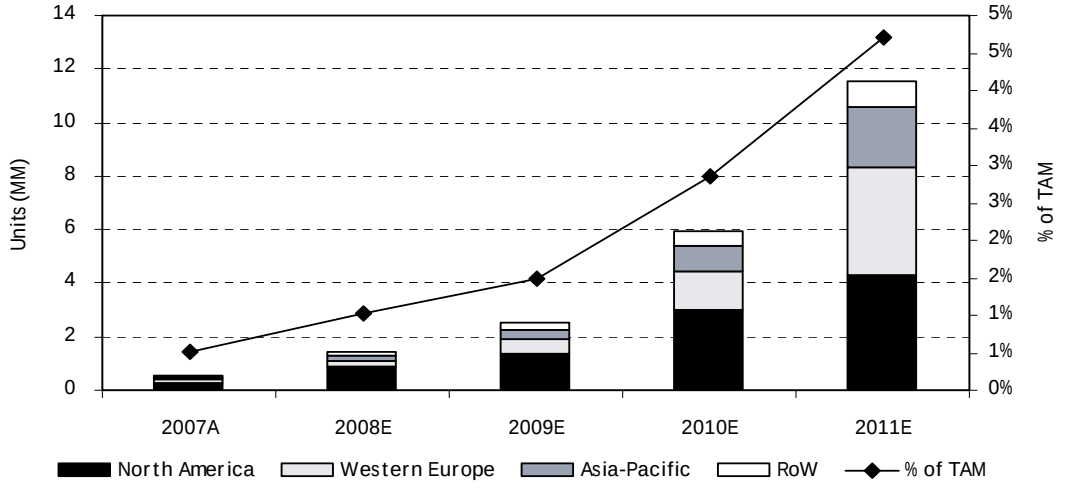
from estimated 60% in calendar year 2005/2006 to 37% CAGR, but remain healthy, given carrier promotions/subsidies, proliferation of low-cost laptops likely without embedded modems, install base of older laptops. PC adapter shipments are expected to rise from 11 million in calendar year 2007 to 38 million in calendar year 2011 (up 37% CAGR); penetration expected to increase from 8% in calendar year 2007 to 12% of TAM (% of laptop install base, three years old, excluding those with embedded modems) in calendar year 2011.

Exhibit 33. PC Adapter Forecast - Units



Source: RBC Capital Markets Research

Exhibit 34. Embedded Modem Forecast - Units



Source: RBC Capital Markets Research

Summary and Conclusions

We believe the global Smartphone market is entering a period of growth outperformance (37% CAGR versus 7% CAGR for the mobile phone market), driven by four key factors: 1) disruptive innovations in mobile software and hardware; 2) rising consumer/business demand for mobile data (messaging, browsing, applications); 3) Faster wireless networks; and 4) mass market Smartphone and data pricing. In this report, RBC sizes the global Smartphone market, and recommends investors with long term (12-18 month) time horizons overweight Apple (AAPL), Research in Motion (RIMM), Microsoft (MSFT). More speculative names we would recommend include Google (GOOG) and Palm (PALM).

- **Smartphone Market Expansion.** RBC sees the global adoption of Smartphones accelerating over next 4 years, expanding 37% CAGR versus 7% CAGR for the mobile phone market (3% mass market phones). When defined as "data-centric" Smartphones (sold with data plans), RBC estimates over 80 million "data-centric" Smartphones were sold in calendar year 2007 (7% of Total Addressable Handset Market or TAM), rising to 294 million units by calendar year 2011 (20% TAM). We estimate there were 83 million "data centric" consumer/prosumer Smartphone users (81% of market) world-wide in calendar year 2007, rising to 375 million by calendar year 2011, at 46% CAGR, with 19 million business users, rising to 74 million by calendar year 2011, at 40% CAGR. We have also sized the outlook for wireless laptops which increasingly are expected to become a facet as well of mobile computing; which we expect to rise from 11 million in calendar year 2007 or 8% of TAM to 50 million in calendar year 2011 or 17% of TAM, four times market expansion (45% CAGR).
- **Historic Confluence.** Our outlook is based upon a historic confluence of factors: 1) iconic Smartphones like Apple's iPhone, Blackberry's Storm, Google's Android phones, etc; 2) global transition from voice-only handsets to Smartphones, driven by demand for mobile email, browsing and data services (applications, location services, media, etc); 3) advancements in handset technologies (display, interface, processor, battery, form factors) offering compelling user experiences; 4) faster 3G networks and heightened carrier focus on data services; 5) lower handset/data pricing reaching mass-market inflection points; 6) momentum of mobile application platforms and third party mobile applications; 7) mobilization of business.
- **Recession Resistant.** Amidst the global economic slowdown, RBC views the Smartphone market – while not recession-proof – as a "market within a market", growing faster than the general handset market, because: 1) mobile data services like email are 'sticky' (less discretionary); 2) the market is international, with developing/emerging economies offsetting slower regions; 3) lower data and handset pricing trends improving affordability; and 4) new product cycles. Although we expect growth to slow to 21% year-over-year in calendar year 2009 (from 52% year-over-year calendar year 2008), we expect Smartphone shipments to grow 37% CAGR by calendar year 2011. Our Scenario Analysis shows 30% upside to our Smartphone Growth Forecast under 2%+ calendar year GDP and 30% downside under -2% calendar year GDP.
- **Vendor Share Shifts.** While facing interim growth/margin threats from economic slowdown, this outlook offers long term positive implications for RIM, Apple, Google Android and Windows Mobile Smartphones. RBC forecasts Apple and RIM continuing to gain share from incumbent vendors Motorola, Nokia (including Symbian), LG, and Samsung. With estimated 1% of TAM (14% Smartphones), RIM need only achieve 1.9% of TAM in calendar year 2008 and 2.8% of TAM in calendar year 2009 to exceed RBC growth expectations in the next two years. Similarly, with 0.3% of TAM (4.4% share data-centric Smartphones), Apple need only achieve 1.2% of TAM in calendar year 2008 and 1.7% of TAM in calendar year 2009 to exceed RBC iPhone growth expectations in the next two years. HTC-branded (estimated 0.3% of TAM), Google Android and Windows Mobile Smartphones are also expected to gain share, although the extent to which depends on building competitive advantages, and successful uptake of pending product cycles.(RBC forecasts 1.1% of TAM for Google, 2.9% for Microsoft by calendar year 2011).

Exhibit 35. Selected Smartphones, By Platform

Platform	BlackBerry		Mac OS X	Google Android	Symbian	Windows Mobile				
Device	Bold 9000	Curve 8310	Apple iPhone 3G	T-Mobile G1	Nokia E71	Moto Q Global	Samsung BlackJack II	Palm Treo 800w	Palm Treo Pro	HTC Touch
										
Size	4.5" x 2.6" x 0.55"	4.2" x 2.4" x 0.6"	4.5" x 2.4" x 0.48"	4.6" x 2.2" x 0.7"	4.45" x 2.24" x 0.39"	4.65" x 2.63" x 0.46"	4.0" x 2.3" x 0.4"	4.41" x 2.28" x 0.73"	4.49" x 2.36" x 0.53"	4.0" x 2.3" x 0.61"
Weight	4.7 oz	3.9 oz	4.7 oz	5.6 oz	4.48 oz	4.73 oz	3.5 oz	5.0 oz	4.69 oz	4.6 oz
Screen	2.5", 480x320 resolution, 65k colours	2.5", 320x240 resolution, 65k colours	3.5", 480x320 resolution, touchscreen	3.2", 480x320 resolution, touchscreen	2.36", 320x240 resolution, 16M colours	2.4", 320x240 resolution	2.4", 320x240 resolution	320x320 resolution, touchscreen	320x320 resolution, touchscreen	2.8" 320x240 resolution, touchscreen
OS	RIM BlackBerry OS	RIM BlackBerry OS	Apple Mac OS X	Google Android	Symbian OS 9.2, S60 3.1	Wndows Mobile 6	Wndows Mobile 6	Windows Mobile 6 with Palm UI	Windows Mobile 6 with Palm UI	Wndows Mobile 6
Communication	UMTS/HSDPA (tri-band), GSM/EDGE (quad-band); Wi-Fi (a/b/g); GPS; Bluetooth (2.0)	GSM/EDGE (quad-band); GPS; Bluetooth (2.0)	UMTS/HSDPA (tri-band), GSM/EDGE (quad-band); Wi-Fi (b/g); GPS; Bluetooth (2.0)	UMTS/HSDPA (dual-band), GSM/EDGE (quad-band); WiFi (b/g); GPS; Bluetooth (2.0)	UMTS/HSDPA (dual-band), GSM/EDGE (quad-band); WiFi(b/g), GPS, Bluetooth (2.0)	UMTS/HSDPA (dual-band), GSM/EDGE (quad-band), GPS, Bluetooth (2.0)	UMTS/HSDPA (tri-band), GSM/EDGE (quad-band), GPS, Bluetooth (2.0)	EV-DO, Wi-Fi, GPS, Bluetooth (2.0)	UMTS/HSDPA (tri-band), GSM/EDGE (quad-band); Wi-Fi (b/g); GPS; Bluetooth (2.0)	EV-DO
Text Input	QWERTY	QWERTY	Touchscreen	Slide-out QWERTY	QWERTY	QWERTY	QWERTY	QWERTY	QWERTY	Touchscreen
Camera	2.0 Megapixel	2.0 Megapixel	2.0 Megapixel	3.2 Megapixel	3.2 Megapixel	2.0 Megapixel	2.0 Megapixel	2.0 Megapixel	2.0 Megapixel	2.0 Megapixel
Video Recording	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Audio Formats	MP3, WMA, 3gp, WMA9 Pro, MIDI, AMR-NB, AAC/AAC+/eACC+	MP3, MIDI, AMR-NB, AAC/AAC+/eAAC+, WMA	AAC, protected AAC, MP3, MP3 VBR, Audible (1, 2, 3), Apple Lossless, AIFF, WAV, iTunes	MP3, AAC, AAC+, WMA	MP3, WMA, AAC, AAC+, eAAC+, RM	MP3, AAC/AAC+/ eAAC+, WAV	MP3, AAC/AAC+/ eAAC+, WAV	MP3, AAC/AAC+/ eAAC+, WAV	MP3, AAC/AAC+/ eAAC+, WAV	MP3, AAC/AAC+/ eAAC+, WAV
Video Formats	MPEG4 (DivX 4), H.263, H.264, AVI, 3GP, MP4, MOV, WMV	MPEG4, H.263 and WMV	M4V, MP4, MOV	H.264, 3GPP, MPEG4	H.263, MPEG4, RealVideo, H.264, Flash Lite 3	MPEG4, H264, H263, WMV	MPEG4, H264, H263, WMV	MPEG4, H264, H263, WMV	MPEG4, H264, H263, WMV	MPEG4, H264, H263, WMV
Memory	1GB on-board; optional 16GB removable microSD/SDHC	64 mb on-board, optional microSD	8GB or 16GB on-board	1GB SD card incl. (supports up to 8GB)	110MB on-board, optional microSD	256MB on-board, optional microSD	128 mb on-board, optional microSD	256 mb on-board, optional microSD	256 mb on-board, optional microSD	256 mb on-board, optional microSD
Processor	624MHz Marvell Tavor PXA930	312 MHz Marvell PXA901	620MHz ARM1176JZF	528Mhz Qualcomm 7201A	369 MHz Freescale	325 MHz	260MHz Texas Instruments OMAP1710	Qualcomm MSM6800A	400MHz Qualcomm MSM7201A	400MHz Qualcomm MSM7200
Email & PIM	Email, calendar & contacts, IM, BIS and 3rd party apps.	Email, calendar & contacts, IM, BIS and 3rd party apps.	Email, calendar & contacts, MobileMe, 3rd party apps.	Email (POP3, IMAP), Google apps (Gmail, Contacts, etc), Amazon music store, IM, 3rd party apps; no MS Exchange.	Email, calendar & contacts, 3rd party applications	Email, calendar & contacts, 3rd party applications	Email, calendar & contacts, 3rd party applications	Email, calendar & contacts, 3rd party applications	Email, calendar & contacts, 3rd party applications	Email, calendar & contacts, 3rd party applications
Battery Life	5 hrs talk; 312 hours standby	4 hrs talk; 408 hours standby	5 hrs 3G Talk, 8 hrs 2G Talk, 7 hrs video, 24 hrs audio, 300 hrs standby	5 hrs talk; 130 hrs standby	4.5 hrs talk; 480 hours standby	5.5 hrs talk; 456 hrs standby	7 hrs talk; 336 hrs standby	4.5 hrs talk; 200 hrs standby	5 hrs talk; 250 hrs standby	3.5 hrs talk; 250 hrs standby
Subsidized Pricing (sample)	$399 (Rogers); £0 (Orange UK)	$99 (AT&T)	8GB - $199 (AT&T), £0-£99 (O2). 16GB - $299 (AT&T), £0-£159 (O2).	$179 (T-Mobile)	TBD	$99 (AT&T)	$99 (AT&T)	$249 (Sprint)	$549 (unsubsidized)	$99 (Sprint)

Source: RBC Capital Markets Research; Company Reports

RBC Capital Markets Interactive Smartphone Forecast Spreadsheet

Interactive Spreadsheet. RBC's interactive spreadsheet, detailing three scenarios of our data-centric Smartphone outlook and market share forecast. Exhibits 36 and 37 illustrate various inputs and outputs of the model.

Exhibit 36. RBC Capital Markets Data-Centric Smartphone Forecast Model – Example View 1

Table 1: Total Mobile Phone Subscribers (MM)

	2007A	2008E	2009E	2010E	2011E	2007-2011E CAGR
Western Europe	478.1	498.6	514.6	529.5	543.8	3.3%
North America	273.0	296.2	316.4	334.7	352.5	6.6%
Asia/Pacific	1,337.6	1,557.5	1,764.6	1,965.8	2,156.5	12.7%
RoW	1,204.9	1,360.7	1,480.4	1,572.2	1,639.8	8.0%
Total Mobile Phone Subscribers	**3,293.6**	**3,713.0**	**4,076.0**	**4,402.3**	**4,692.6**	**9.3%**

Table 2: RBC Data-Centric Smartphone Users (% of Total Mobile Phone Users)

	2007A	2008E	2009E	2010E	2011E
Western Europe	6.8%	8.7%	10.5%	13.5%	17.9%
North America	11.3%	14.4%	17.4%	22.5%	29.5%
Asia/Pacific	2.1%	3.5%	5.1%	6.5%	8.2%
RoW	0.9%	1.8%	2.5%	3.3%	4.3%
Worldwide	**3.1%**	**4.4%**	**5.8%**	**7.4%**	**9.6%**

Table 3: RBC Data-Centric Smartphone Users (MM)

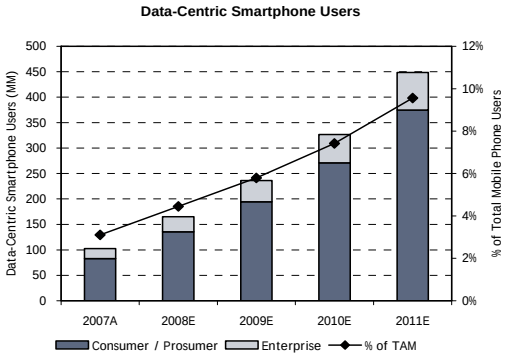
	2007A	2008E	2009E	2010E	2011E	2007-2011E CAGR
Western Europe	32.3	43.4	54.0	71.5	97.3	31.8%
North America	30.7	42.7	55.1	75.3	104.0	35.6%
Asia/Pacific	28.5	54.5	90.0	127.8	176.8	57.8%
RoW	10.8	24.7	37.0	51.9	70.5	59.9%
Worldwide	**102.3**	**165.2**	**236.1**	**326.5**	**448.7**	**44.7%**

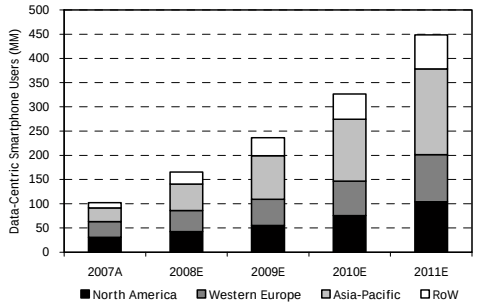
Table 4: Consumer / Prosumer vs. Enterprise Data-Centric Smartphone Users (MM)

	2007A	2008E	2009E	2010E	2011E	2007-2011E CAGR
Consumer / Prosumer Data-Centric Users	82.9	135.5	194.8	271.0	374.6	45.8%
Consumer / Prosumer % of Users	81%	82%	83%	83%	84%	
Enterprise Data-Centric Users	19.4	29.7	41.3	55.5	74.0	39.7%
Est. Enterprise % of Users	19%	18%	18%	17%	17%	

Table 5: Total Mobile Phone Units / TAM (MM)

	2007A	2008E	2009E	2010E	2011E	2007-2011E CAGR
Western Europe	182.4	179.9	158.4	166.3	174.7	-1.1%
North America	172.3	174.9	138.6	155.9	169.9	-0.4%
Asia/Pacific	440.1	508.1	594.0	653.6	736.7	13.7%
RoW	349.5	377.3	393.7	393.9	417.0	4.5%
Worldwide TAM	**1,144.3**	**1,240.2**	**1,284.7**	**1,369.7**	**1,498.4**	**7.0%**





Source: RBC Capital Markets Research

Exhibit 37. RBC Capital Markets Data-Centric Smartphone Forecast Model – Example View 2

	2007A	2008E	2009E	2010E	2011E	2007-2011E CAGR
RIM						
Users	12.2	22.1	36.5	55.6	76.5	58.4%
% Data Centric Smartphone Users	*11.9%*	13.4%	15.5%	17.0%	17.1%	
% of Total Mobile Phone Users	*0.4%*	*0.6%*	*0.9%*	*1.3%*	*1.6%*	
Units	**11.4**	**23.2**	**35.5**	**44.5**	**51.1**	45.4%
% Data Centric Smartphone Handsets	*13.7%*	*18.3%*	*23.1%*	*21.3%*	*17.4%*	
% TAM (units)	*1.0%*	*1.8%*	*2.5%*	*2.9%*	*3.1%*	
Apple						
Users	3.7	17.4	34.4	51.7	69.8	108.3%
% Data Centric Smartphone Users	*3.6%*	10.5%	14.6%	15.8%	15.6%	
% of Total Mobile Phone Users	*0.1%*	*0.5%*	*0.8%*	*1.2%*	*1.5%*	
Units	**3.7**	**14.4**	**22.4**	**31.6**	**41.6**	83.0%
% Data Centric Smartphone Units	*4.4%*	*11.4%*	*14.6%*	*15.2%*	*14.1%*	
% TAM (units)	*0.3%*	*1.1%*	*1.6%*	*2.1%*	*2.5%*	
Microsoft						
Users	20.0	27.3	35.4	49.8	71.8	37.7%
% Data Centric Smartphone Users	*19.5%*	16.5%	15.0%	15.3%	16.0%	
% of Total Mobile Phone Users	*0.6%*	*0.7%*	*0.9%*	*1.1%*	*1.5%*	
Units	**15.3**	**19.8**	**21.8**	**32.1**	**48.2**	33.2%
% Data Centric Smartphone Units	*18.4%*	*15.6%*	*14.2%*	*15.4%*	*16.4%*	
% TAM (units)	*1.3%*	*1.5%*	*1.6%*	*2.1%*	*2.9%*	
Symbian						
Users	46.0	70.2	90.9	122.4	170.5	38.7%
% Data Centric Smartphone Users	*45.0%*	42.5%	38.5%	37.5%	38.0%	
% of Total Mobile Phone Users	*1.4%*	*1.9%*	*2.2%*	*2.8%*	*3.6%*	
Units	**38.4**	**52.9**	**55.8**	**75.0**	**115.5**	31.7%
% Data Centric Smartphone Units	*46.1%*	*41.7%*	*36.3%*	*36.0%*	*39.3%*	
% TAM (units)	*3.3%*	*4.1%*	*4.0%*	*4.9%*	*7.0%*	
Google Android						
Users	0.0	0.5	4.0	9.7	20.9	NA
% Data Centric Smartphone Users	*0.0%*	0.3%	1.7%	3.0%	4.7%	
% of Total Mobile Phone Users	*0.0%*	*0.0%*	*0.1%*	*0.2%*	*0.4%*	
Units	**0.0**	**0.5**	**3.8**	**8.3**	**17.6**	NA
% Data Centric Smartphone Units	*0.0%*	*0.4%*	*2.5%*	*4.0%*	*6.0%*	
% TAM (units)	*0.0%*	*0.0%*	*0.3%*	*0.5%*	*1.1%*	
Palm						
Users	2.6	4.2	5.5	7.9	11.2	43.4%
% Data Centric Smartphone Users	*2.6%*	2.5%	2.3%	2.4%	2.5%	
% of Total Mobile Phone Users	*0.1%*	*0.1%*	*0.1%*	*0.2%*	*0.2%*	
Units	**1.8**	**3.3**	**4.1**	**6.1**	**8.5**	47.6%
% Data Centric Smartphone Units	*2.2%*	*2.6%*	*2.6%*	*2.9%*	*2.9%*	
% TAM (units)	*0.2%*	*0.3%*	*0.3%*	*0.4%*	*0.5%*	
Linux						
Users	15.8	19.6	25.0	24.7	22.4	9.1%
% Data Centric Smartphone Users	*15.4%*	*11.9%*	*10.6%*	*7.6%*	*5.0%*	
% of Total Mobile Phone Users	*0.5%*	*0.5%*	*0.6%*	*0.6%*	*0.5%*	
Units	**10.6**	**9.6**	**7.1**	**7.7**	**7.4**	-8.7%
% Data Centric Smartphone Units	*12.7%*	*7.6%*	*4.6%*	*3.7%*	*2.5%*	
% TAM (units)	*0.9%*	*0.8%*	*0.5%*	*0.5%*	*0.4%*	
Other						
Users	2.0	3.9	4.4	4.6	5.6	29.2%
% Data Centric Smartphone Users	*2.4%*	2.3%	1.8%	1.4%	1.3%	
% of Total Mobile Phone Users	*0.1%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*	
Units	**2.0**	**3.0**	**3.1**	**3.1**	**4.1**	19.6%
% Data Centric Smartphone Units	*2.4%*	*2.4%*	*2.0%*	*1.5%*	*1.4%*	
% TAM (units)	*0.2%*	*0.2%*	*0.2%*	*0.2%*	*0.2%*	

Source: RBC Capital Markets Research

Glossary

1G – First Generation wireless technology. Based on analog or AMPS technology, 1G wireless networks were designed to carry voice traffic only.

2G – Second Generation wireless technology. Based on digital technology, 2G wireless networks offer increased voice quality and capacity over 1G systems. 2G systems traditionally supported voice and circuit-switched data service. 2G systems are being replaced today by 2.5G and 3G networks.

2.5G – Based on digital technology, adding 2.5G wireless technology to a 2G network provides packet-data service and improved data rates. 2.5G technology has been implemented as GPRS.

3G – Third Generation wireless technology. Based on digital technology, 3G wireless networks offer increased voice capacity and provide higher data rates than 2G and 2.5G networks. As defined by the International Telecommunications Union (ITU), 3G technology has been or will be implemented as CDMA2000, CDMA2000 1xEV-DO, WCDMA/UMTS and HSDPA/HSUPA.

3DES – Triple Data Encryption Standard. A private key symmetric cryptographic algorithm, that protects computer data by encoding (converting) the data three times for greater security. 3DES was issued as a Federal Information Processing Standard and is an updated version of DES.

3GPP – Third Generation Partnership Project, the standards body that oversees WCDMA .

3GPP2 – Third Generation Partnership Project 2, the standards body that oversees CDMA2000.

802.11 – 802.11 refers to the body of standards issued by the IEEE (Institute of Electrical and Electronics Engineers) for WLANs (wireless local area networks). 802.11 technologies use an over-the-air interface to connect a device (for example, a Wi-Fi-enabled laptop) and an access point to another network. The 802.11 family of technologies includes 802.11a, 802.11b, 802.11g and 802.11n.

Access Point – A network device, or communication hub, that connects wireless devices to a wired local area network (LAN).

AES – Advanced Encryption Standard. A standard for encryption intended to replace the DES (Data Encryption Standard). AES supports key lengths ranging from 128 to 256 bits.

A-GPS – Assisted-Global Positioning System. A technology used to determine an end-user's position in urban areas or dense outdoor environments. Differs from traditional GPS by adding an assistance server, which shares tasks with the A-GPS receiver to expedite position location.

AMPS – Advanced Mobile Phone Service. The first analog cellular phone system commercially deployed in the 1980s.

Analog – In telecommunications, an early wireless network technology involving the modulation of radio signals, which transmit information as sound waves over radio signals allowing one call per channel.

API – Application Programming Interface. A set of standard methods or functions that application programs can use to access a particular set of services or tools, such as network services and program-to-program commands. For example, BREW® provides a set of APIs for the development of applications for wireless devices.

ARPU – Average Revenue Per User. The monthly revenue generated by a consumer's wireless device usage. ARPU is commonly used by wireless network operators and telecommunications/wireless analysts to estimate ROI (return on investment) measures for investments in network infrastructure and end-user services.

Bandwidth – In wireless communications, the width or capacity of a communications channel. Analog bandwidth is measured in hertz (Hz). Digital bandwidth is the volume of data that a channel can carry and is measured in bits per second (bps).

BCMCS – Broadcast Multicast Service. A standard being developed for third-generation (3G) cellular networks. Provides transmission of multimedia data from a single source to all subscribers

in a specific area. Examples of multicast content could include video and movie clips, news, sports or stock quotes.

Bluetooth – A short-range wireless technology that interconnects devices such as phones, computers, keyboards, microphones and mice. Bluetooth supports both voice and data communications.

Bps – Bits Per Second. The standard for measuring the smallest unit of information in digital communications and data processing.

BREW – Binary Runtime Environment for Wireless. An open, extensible client platform developed by Qualcomm to support system and application software, including personalized and branded user interfaces. May be used with most wireless devices and networks. A component of the BREW System.

Broadband – Generic term for high-speed digital Internet connections, such as wireline, DSL or cable modems and wireless third-generation technologies, such as WCDMA (UMTS), CDMA2000 1xEV-DO and HSDPA .

CDMA – Code Division Multiple Access. A digital wireless technology that works by converting analog information, such as speech, into digital information, which is then transmitted as a radio signal over a wireless network. CDMA uses spread-spectrum technology, decreasing potential interference while achieving privacy. CDMA technology is the basis for third-generation (3G) wireless technologies which offer increased voice capacity and provide higher data rates than 2G and 2.5G networks.

CDMA2000 1X – A family of third-generation (3G) wireless standards that offers enhanced voice and data capacity and higher data rates than previous, second-generation wireless standards. The CDMA2000 family of standards includes CDMA2000 1X and CDMA2000 1xEV-DO.

CDMA2000 1xEV-DO – CDMA2000 1X Evolution – Data Optimized. Third-generation wireless technology that offers broadband data speeds to support applications such as VPN access, video downloads and large file transfers. CDMA2000 1xEV-DO is a direct evolution of CDMA2000 1X.

CDMA2000 1xEV-DV – CDMA2000 1X Evolution Data and Voice. Third-generation wireless technology that supports high-speed voice and data on the same channel. Enables Internet connectivity for cellular phones, PDAs and other mobile devices.

cdmaOne – A brand name, trademarked and reserved for the exclusive use of the CDMA Development Group (CDG) member companies. cdmaOne was the coined term for Qualcomm's original CDMA systems based on the IS-95A and IS-95B standards.

CDPD – Cellular Digital Packet Data. An add-on technology that enables first-generation (1G) analog systems to provide packet data. Today, 2.5G and 3G systems are replacing CDPD.

Cellular – Analog or digital communications that provide a consumer with a wireless connection from the mobile device to a relatively nearby transmitter (base station). The transmitter's coverage area is called a cell.

Channel – The amount of wireless spectrum occupied by a specific technology implementation. For cellular communications, there is a transmit side and a receive side. For example, a 5 MHz channel uses 5 MHz to transmit and 5 MHz to receive, using a total of 10 MHz of wireless spectrum.

Circuit-Switched Network – Networks that temporarily establish a physical circuit "connection" and keep that circuit reserved for the user until a disconnect signal is received. A dial-up modem is an example of a circuit-switched connection. In contrast, a packed-switched network are connectionless or "always on," eliminating the need to initiate a connection for data transfer.

Digital – A form of transmission that transforms analog signals, such as voice, into a series of electrical or optical pulses that represent the binary digits 0 and 1. Digital networks offer superior Quality of Service (QoS), secure transmission and more bandwidth than analog lines.

DRM – Digital Rights Management. Technology for copyright protection of digital media, including ringtones, music, graphics and video. Developed to prevent the illegal distribution of purchased content over the Internet.

Dual Mode – Functionality that allows a mobile phone to operate in two different modes for greater roaming capabilities. For example, a mobile phone may be equipped to support both CDMA2000 and WCDMA standards to send and receive calls.

DVB-H – Digital Video Broadcasting – Handhelds. A multicast technology standard specified by the DVB Project for the multicast delivery of TV-like programming to wireless devices. With DVB-H, one signal is sent from the base station and received by all subscribing devices within range.

EDGE – Enhanced Data Rates for Global Evolution. A software/hardware enhancement for existing GSM networks designed to provide higher data rates to enhance the delivery of multimedia and other broadband applications for wireless devices.

Encryption – In security, encryption is the ciphering of data by applying an algorithm to plain text. Types include Asymmetric, Symmetric and Public Key.

Firewall – A combination of hardware and software that protects a computer or group of computers from an attack by an outside network or computer user. A firewall enforces a boundary between two or more networks.

Flash Memory – A type of memory that can be erased and reprogrammed (rewritten). Commonly used in mobile phones, digital cameras, audio players and removable memory cards, such as Memory Sticks or Secure Digital (SD) Cards.

FOMA – NTT DoCoMo's WCDMA-compliant 3G network. Supports high-volume, high-speed wireless data transmission to enable multimedia services such as videophone and video mail.

GPRS – General Packet Radio Service. A 2.5G technology standard that is an upgrade to a GSM network. Adds packet data to the existing voice network.

GPS – Global Positioning System. A worldwide radio-navigation system developed by the U.S. Department of Defense to enable users to determine their exact location anywhere on the globe. GPS works via radio signals sent from orbiting satellites to receivers on the ground.

GSM – Global System for Mobile Communications. A second-generation wireless telecommunications standard for digital cellular services first deployed in Europe. GSM is based on TDMA technology and provides circuit-switched data connections.

H.263 – A video compression standard developed by the International Telecommunications Union (ITU) for transmitting video over limited bandwidth connections, such as mobile networks. Supports only the visual portion of the video stream; the audio portion is handled separately.

H.264 (MPEG-4 AVC) – A high-compression, digital video standard that offers greater compression than previous standards. Considered an option for transmitting full-motion video over wireless and Internet connections. Jointly developed by the International Telecommunications Union (ITU) and the ISO Moving Picture Experts Group (MPEG).

Hot Spot – A location, such as a coffee shop, airport or bookstore, where a consumer can establish a WLAN (wireless local area network) or Wi-Fi connection. Hot spots provide a wireless access point for the user and limited coverage (approximately 100 feet), depending on the location.

HSDPA – High-Speed Downlink Packet Access. An enhancement to WCDMA networks that provides higher data speeds in the downlink to support applications such as VPN access, video downloads and large file transfers.

HSUPA – High-Speed Uplink Packet Access. An enhancement to WCDMA networks that provides higher data speeds in the uplink to support applications such as VPN access and large file transfers.

iDEN – Integrated Dispatch Enhance Network. A proprietary technology from Motorola based on the TDMA standard that allows users to access phone calls, two-way radio transmissions, paging

and data from one wireless device. Nextel Communications® uses iDEN technology as the basis for its networks.

i-mode – Internet Mode. A proprietary cell phone service based on cHTML technology developed by Japan's NTT DoCoMo. i-mode supports Web content and services, such as mobile banking, email and news reporting for cellular phones.

IMS – IP Multimedia Subsystem. An open industry standard for voice and multimedia communications over packet-based IP networks. Supports technologies such as IM (instant messaging), VoIP (voice over Internet protocol), push to talk (PTT) and video calling.

IP Datacasting – Simultaneous transmission of content from a single source to a large number of wireless subscribers. Usually refers to the delivery of a wide variety of TV-like programming to wireless devices, and can also include IP-based content such as games or video and audio files.

Java – A programming language developed by Sun Microsystems for creating and running software programs on a single computer and in networked environments, such as the Internet. Java programs are portable and can be run anywhere in a network that has a Java virtual machine (JVM).

LBS – Location Based Services. Enables operators to offer personalized services based on the user's location. Examples of LBS include regional map information for real estate agents and asset tracking solutions for service representatives at logistics and transportation companies.

LTE -Long Term Evolution. A highly optimized mobile broadband OFDMA solution designed from the ground up to deliver high-speed broadband data, voice (VoIP), and Multimedia services. LTE complements existing 3G solutions by leveraging wider bandwidths (up to 20MHz), and advanced antenna techniques (MIMO, SDMA and Beam forming).

Mbps – Megabits per second. Measured as one million bits per second. A measurement of the amount of data transferred in one second between two telecommunication points.

MHz – Megahertz. One million hertz or cycles per second. A measurement often used to describe the speed of digital and analog signals.

Microbrowser – A Web browser specialized for a wireless phone, smartphone or PDA optimized to run in the low-memory and small-screen environment of a handheld device.

MMS – Multimedia Messaging Service. Allows wireless device users to send multimedia, such as video or digital photos, from one device to another.

MPEG-3 (MP3) – Moving Picture Experts Group-3. A standard for compressing audio into a compact file without losing a significant amount of its quality. Used for the mobile transmission and storage of audio files.

MPEG-4 (MP4) – Moving Picture Experts Group-4. A standard for compressing video into a compact file without losing a significant amount of its quality. Used for the transmission and storage of images and video clips.

Multicast – Simultaneous transmission of content from a single source to large numbers of wireless subscribers. Usually refers to the delivery of a wide variety of TV-like programming to wireless devices.

Packet-Switched Network – Networks that transfer digital packets of data. Packet-switched networks are connectionless or "always on," eliminating the need to connect to a network to send or receive data. In contrast, circuit-switched networks require a dedicated circuit, or connection, for the duration of the data transmission.

PC Card – A wireless modem that can be used in a laptop or other mobile computing device to connect to the Internet. Synonymous with PCMCIA card, WWAN (wireless wide area network) card and Aircard®.

PCMCIA – Personal Computer Memory Card International Association. An international association that standardizes credit-card sized wireless modems which can be inserted into laptops

or other mobile computing devices to connect to the Internet. A Type II PC card is the most common PCMCIA card.

PCS – Personal Communications Services. Refers to the 1900 MHz cellular frequency band. More commonly used as a marketing term to describe digital wireless services in the Americas, regardless of the particular frequency band being used.

PDC – Personal Digital Cellular. The second-generation TDMA-based wireless technology used in Japan. PDC is incompatible with other wireless networks.

PDSN – Packet Data Serving Node. Refers to the routers used in CDMA2000 wireless networks that comprise the backbone of the network.

PIM – Personalized Information Manager. Software for keeping track of contact addresses and phone numbers, appointments, project schedules and task lists. Sometimes called a contact manager.

PSTN – Public Switched Telephone Network. Refers to the local, long-distance and international phone system. In the United States, PSTN refers to the entire collection of interconnected phone companies.

PTT – Push-To-Talk®. In two-way radio communications, PTT is an instant connection made between two cell phones. PTT works like a "walkie-talkie" and requires transmitters to use the same frequency. The best known example in the United States is Nextel's Direct Connect® service.

Public Key Encryption – A method of securing data for transmission that equips each user with two keys, a private key and a public key. Each individual uses the other's public key to encrypt the data that is sent and then each individual uses their own private key to decrypt the data received. A trusted third party often provides keys.

RFID – Radio Frequency Identification. A method of remotely retrieving data from and storing data associated with animals, people, products or equipment. Requires an RFID tag which contains an antenna to enable the tag to send and receive queries from an RFID transceiver.

SIM – Subscriber Identity Module. A removable card built into all GSM phones and other mobile devices. The SIM identifies the user's subscriber information, such as handset number and wireless features, and can also store data, including telephone numbers and addresses.

SIP – Session Initiation Protocol. A standard protocol defined by the Internet Engineering Task Force (IETF). Used to initiate an interactive multimedia user session such as chat, video, voice or gaming.

SMS – Short Messaging Service. A store-and-forward message service available on many second-generation and all third-generation wireless networks that allows users to send and receive short text messages over wireless devices.

SSL – Secure Sockets Layer. A protocol for managing the security of message transmission on the Internet, for example, between a Web server and a Web browser.

TD-SCDMA – Time Division-Synchronous Code Division Multiple Access. A third-generation, (3G) wireless standard that offers enhanced voice and data capacity and higher data rates than previous second generation wireless standards. One of the three international CDMA technology-based standards accepted by the ITU for third-generation wireless communications.

TDMA – Time Division Multiple Access. A second-generation, digital wireless communication technology that increases the amount of data that can be delivered by dividing each cellular channel into time slots. Wireless standards that use TDMA technology include GSM, PDC and iDEN.

Tri-Mode – Triple Mode. Functionality that allows a mobile phone to transmit in three modes for wider coverage area. For example, a mobile phone may be equipped to use analog, 800 MHz cellular and 1900 MHz PCS frequencies to make and receive calls.

UMTS/WCDMA – Universal Mobile Telecommunications System/Wideband CDMA. A third-generation (3G), CDMA-based wireless communication standard that offers enhanced voice and data capacity and higher data rates than previous, second generation wireless technologies.

VoIP – Voice Over Internet Protocol. The routing of voice conversations, sent as digital packets of data, over the Internet or other IP network.

VPN – Virtual Private Network. A network that is constructed using public wires to connect remote offices or individual users to their organizations' network. VPNs use encryption and other security mechanisms to ensure network access to authorized users. VPNs are an essential component of secure wireless computing for the enterprise.

WAN – Wide Area Network. A geographically dispersed telecommunications network. A WAN may be privately owned or rented, but the term usually refers to a public network.

WAP – Wireless Application Protocol. A set of standards that enables a wireless device to browse content from specially coded Web pages over wireless devices such as mobile phones.

Wi-Fi – Short for "Wireless Fidelity" and another name for WLAN (wireless local area network). Allows a mobile user to connect to a local area network (LAN) through a wireless connection.

WiMAX – Wireless Interoperability for Microwave Access. A group of proposed wireless standards for high-throughput broadband connections over long distances. Applications include "last mile" broadband connections and hot spots. Trade name for a new family of IEEE 802.16 wireless standards.

Source: Qualcomm

Price Target Justifications

Apple Inc. (NASDAQ: AAPL; Sector Perform, Above Average Risk; $125 target; $95.88). Our $125 target is DCF-based (WACC of 13%, 4.5% terminal rate, FTM cash $34.88/sh) and equates to 25x FTM P/E.

Google Inc. (NASDAQ: GOOG; Outperform, Average Risk; $525 target; $318.78)*. To arrive at our target price of $525, we have taken a blended approach using P/E, EV/EBITDA, and FCF yield on our 2009 estimates. Applying a target multiple of 25x to our adjusted 2009 EPS estimate yields $554. Our target EV/EBITDA multiple is 14x and its application to our 2009 EBITDA estimate yields a target of $544. Application of an FCF yield of 4.0% to our 2009 estimate yields a target of $472. **Covered by RBC Capital Markets Corp. Analyst Ross Sandler (212) 428-6227.*

Microsoft Corporation (NASDAQ: MSFT; Sector Perform, Average Risk; $27 target; $21.30). Our $27 price target assumes shares trade at 12.9x FTM P/E.

Palm, Inc. (NASDAQ: PALM; Sector Perform, Above Average Risk; $8.00 target; $3.01). Our $8.00 target is DCF-based (11.0% WACC, terminal growth of 2%, and FTM net debt of $1.54/sh) and equates to 0.9x EV/FTM sales.

Research in Motion (NASDAQ: RIMM; TSX: RIM; Sector Perform, Above Average Risk, $65 target; $46.58). Our $65 target is DCF-based (14% WACC, 4.5% terminal rate, FTM cash $5.65/sh), and equates to 16x our FTM EPS, vs. historical 10-46x.

Price Target Impediments

Apple Inc. (NASDAQ: AAPL). Impediments to our target include: more severe than expected iPhone product glitches; product launch delays; unknown market acceptance of new products; high carrier service pricing could limit iPhone growth or market expansion; stronger than expected competitive response to iPhone; higher than expected opex spending; slower than expected international launches; greater than expected iPod cannibalization or purchasing delays; slower than expected Macintosh market share gains; channel conflicts or execution; key executives or staff departures. Although we expect Apple to deliver strong results, we see Apple's valuation multiple vulnerable, should market sentiment continue to deteriorate and could compress on further on unexpected competitive developments, execution stumbles, unexpectedly slowing growth, declining margins, PC market concerns, or decline in overall market or technology market valuations.

Google Inc. (Q: GOOG). The Key Risk for Google Is Competition: Well-funded competitors compete for users, search query volume, search network affiliates, and technological supremacy. Microsoft recently launched its own paid search initiative in an effort to take back some share. The other main risk is that of decelerating growth in paid search overall, and at Google, which would impact the company's trading multiple. Additionally, we believe gauging the market's reaction to stock option expensing and increasing capital expenditures remains a risk for all technology companies. Any of these factors could prevent the stock from reaching our price target.

Microsoft Corporation (NASDAQ: MSFT). Our price target is based on future revenues and earnings, which could be at risk to: competition from the open-source and software as a service sales model, piracy, antitrust litigation, government litigation or regulatory activity, product delays, supply shortages, and dilutive ventures or acquisitions.

Palm, Inc. (NASDAQ: PALM). Impediments to our target include protracted inventory buildup, inability to sign new carriers, a general tech pullback, better than expected competitive traction at Palm's expense; product delays or market acceptance risks; scale and execution risk; unexpected management or staff changes, and inability to launch new products successfully. Palm faces execution risk from the pending launch of multiple smartphones on multiple operating systems, radio technologies, and expanding carrier distribution internationally. The launch of competitive devices may cause some 'headline risk' to Palm's valuation multiple.

Research in Motion (NASDAQ: RIMM; TSX: RIM). Impediments to our target include: a general decline in technology valuations; stronger than expected competitive impacts; unknown market acceptance of new products; faster than expected declines in ARPU, Margins and ASPs; product launch delays; Op Ex spending may be higher than expected; high carrier service pricing could limit RIM's growth; ongoing litigation risk; adverse outcomes from RIM's option investigation; failure to successfully transition into the high-end consumer market; key executives may depart; competition may also gain more market share more strongly than expected; RIM may face scale and or execution risk, protracted delays in international expansion or licensee deployment.

Company Descriptions

Apple Inc. (NASDAQ: AAPL). Apple, founded in 1976, is a California-based designer, manufacturer, and marketer of differentiated personal computers, software and services. Products include the Macintosh line of personal computers, Mac OS X operating system and related application software (iLife, iWork, etc), services, and peripherals, the iPod line of portable digital media players, the iTunes online media store, and the iPhone smartphone. Apple is positioned in the high-end consumer sector, a strong global brand and fiercely loyal customer base, supported by its retail store network. Apple has approximately 18,000 employees.

Google Inc. (Q: GOOG). Google is a top search destination on the Web and provides a leading search marketing platform for advertisers and merchants.

Microsoft Corporation (NASDAQ: MSFT). Microsoft Corporation develops software, as well as manufactures, licenses, and supports software products for various computing devices worldwide. The company has five divisions. Client division develops and sells the Windows operating systems for personal computers (PCs). The Server and Tools division develops and maintains components of the Windows Server System including SQL database server and ISA server. The Online Service Group includes MSN and Live.com domains, which consists of email and instant messaging services, and online search and premium content; it also provides Internet access, and Web and mobile services. The Business Division includes Information Worker segment (Office Suite) and Business Solutions segment, which provides software to manage financial, customer relationship, and supply chain management functions. The Entertainment and Devices division is comprised of the Mobile and Embedded Devices segment, which offers mobile software platform that reside on PDAs, smartphones, and other devices, and the Home and Entertainment segment, which offers the Xbox video game system.

Palm, Inc. (NASDAQ: PALM). CA-based Palm, Inc. provides handheld computing and wireless communications solutions. Products include Zire and Tungsten handhelds, wireless Treo smartphones, software and accessories. Its products are sold through Internet, retail, reseller and wireless operators including Sprint, Verizon Wireless, and Cingular in US and Vodafone and others Internationally at retail stores and online.

Research in Motion (NASDAQ: RIMM; TSX: RIM). Research In Motion, established 1984, is a Waterloo-based developer, manufacturer, and marketer of wireless handheld devices, software, and messaging-based wireless services. Products include the BlackBerry wireless handhelds, OEM radio modems, BlackBerry Enterprise Server (BES) software, and the BlackBerry data service backed by RIM's NOC (Network Operations Center) infrastructure. Revenues are generated from the sale of wireless devices, recurring service fees ('redirector fees') for managing carrier messaging infrastructure, enterprise server software revenue, the sale of radio modems to OEM manufacturers, and nonrecurring engineering (NRE) revenues. The BlackBerry service is both integrated with its own handhelds and has been licensed (under the BlackBerry Connect program) by leading handset manufacturers including Nokia, Samsung, Siemens, and Motorola.

Required Disclosures

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Outperform (O): Expected to materially outperform sector average over 12 months.

Sector Perform (SP): Returns expected to be in line with sector average over 12 months.

Underperform (U): Returns expected to be materially below sector average over 12 months.

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Average Risk (Avg): Volatility and risk expected to be comparable to sector; average revenue and earnings predictability; no significant cash flow/financing concerns over coming 12-24 months; fairly liquid.

Above Average Risk (AA): Volatility and risk expected to be above sector; below average revenue and earnings predictability; may not be suitable for a significant class of individual equity investors; may have negative cash flow; low market cap or float.

Speculative (Spec): Risk consistent with venture capital; low public float; potential balance sheet concerns; risk of being delisted.

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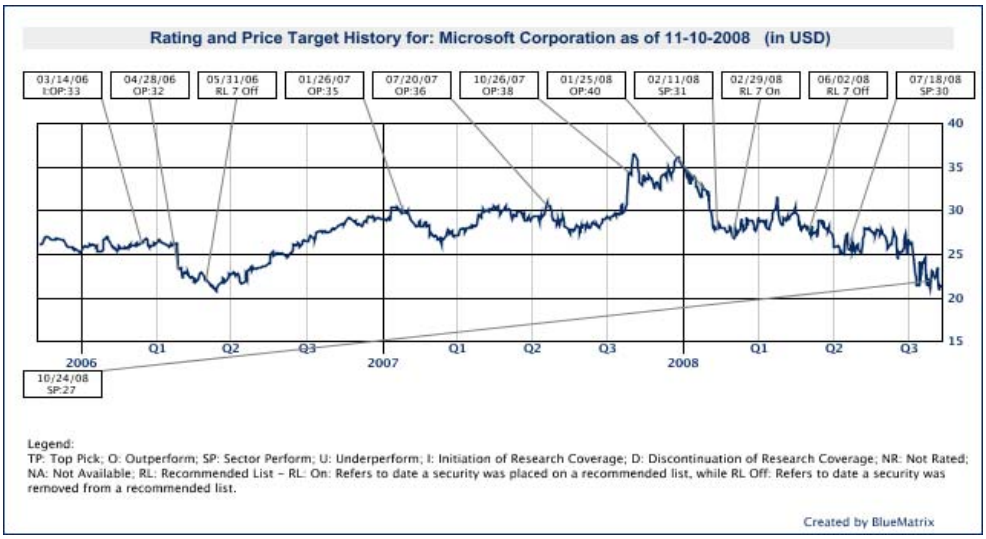

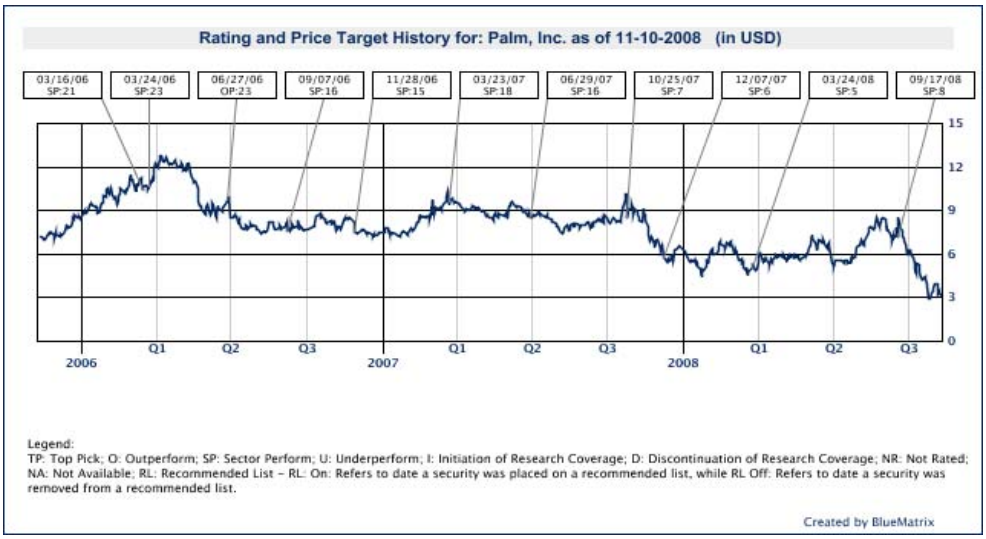

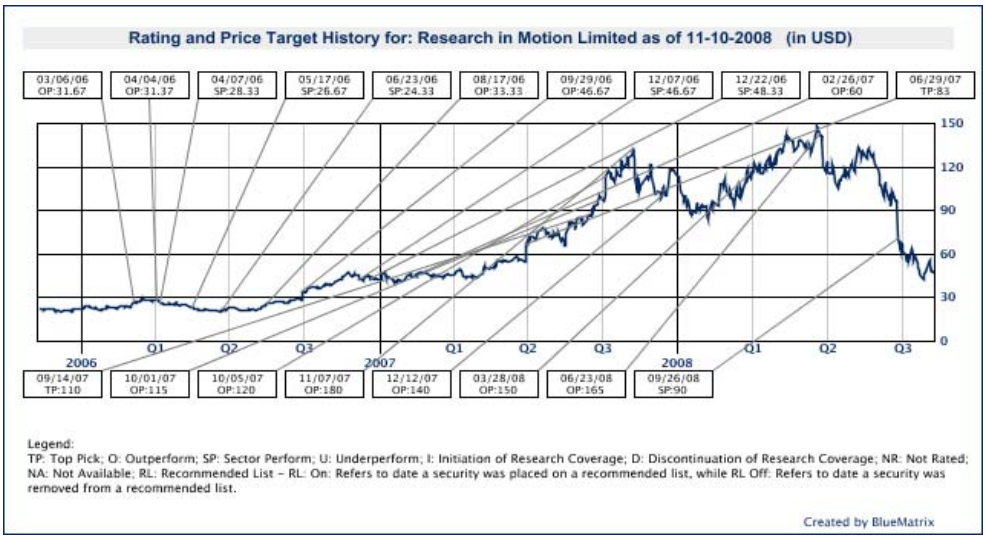

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