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# The Mobile Architecture Imperative

by Jeffrey Hammond and Ellen Daley  
for Enterprise Architecture Professionals

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Architect For Thin And Thick Mobile Clients For The Next Five Years

by **Jeffrey Hammond and Ellen Daley**

with Gene Leganza, Benjamin Gray, and Heidi Lo

## EXECUTIVE SUMMARY

The past eight years have shown little business adoption of mobile applications beyond wireless email and a few key applications. As a result, firms have been able to limp along without comprehensive mobile architectures. No longer. Today, the imperative for defining a holistic mobile architecture is red hot. As IT reacts to a chaotic increase in device types, wireless networks, and demand for mobile apps, firms report that providing more mobility support to information workers, task workers, and now customers ranks at the top of their 2008 priorities. Enterprise architecture professionals must assess which applications these mobile users want and the attributes of that use — the devices, networks, and security — as well as define an architecture that can support development, management, and security. In the end, two major architectures — thin client and thick client — will evolve, and a comprehensive mobile architecture strategy will need to include both options.

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Forrester interviewed 15 vendor and user companies, including Antenna Software, Avaya, Compuware, Delta Air Lines, Dexterra, Electronic Data Systems (EDS), Exxon Mobil, Gearworks, General Motors, Progress Energy, Research In Motion (RIM), Safeway, Sybase, and Vetto.

### Related Research Documents

["Inquiry Insights: Enterprise Mobility, Q1 2008"](#)  
March 4, 2008

["Forrester TechRadar™: Enterprise-Class Mobile Devices And Management Solutions, Q1 2008"](#)  
January 31, 2008

["The Mobile Web Versus The Web On An iPhone: iPhone Wins In A Blowout"](#)  
July 31, 2007

## MOBILITY HAS BEEN ON A PERENNIAL SLOW BURN

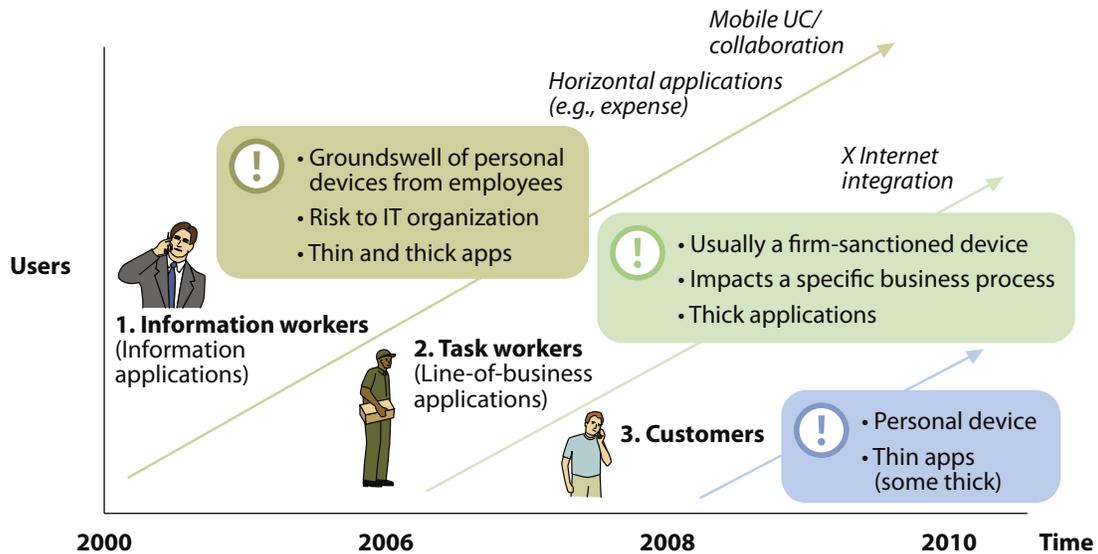
Eight years ago — just at the cusp of the dot-com bust — mobility was seen as the next logical extension of the Internet. Firms were promised a “mobile enterprise” where employees, partners, and customers would interact over mobile devices using a myriad set of applications — and told that they needed infrastructure (mobile middleware) to develop and manage the mobile apps. The reality? The past eight years has seen little movement beyond adoption of wireless email and a few key mobile applications like clinical management apps for nurses in a hospital or dispatch apps for field service personnel.<sup>1</sup> In turn, the 2000 embryonic mobile middleware market — heavily infused with venture capital (VC) investment — collapsed.<sup>2</sup> Firms that did deploy mobile applications did so in silos, separate from traditional IT infrastructure and other mobile apps.

Today, Forrester sees potent shifts on the horizon resulting in deeper and broader mobile application adoption as companies become aware of the opportunities that mobility offers. But there’s a catch: Seizing these opportunities will require companies to become more disciplined in their approach to mobility because the new options for mobile application development will be many, varied, and not necessarily compatible. Enterprise architectural professionals that can put the appropriate architectural and application frameworks in place will position their firms to seize the opportunities and manage the risk of mobility for information workers, task workers, and customers — each with specific application, security, and architectural requirements (see Figure 1).

To support these constituencies, two dominant mobile application architectures will coexist: thin and thick architectures. Even though Web applications will grow in importance, they won’t necessarily replace native applications that provide access to key on-device capabilities like location services, local data storage, and occasionally connected operation. And with new mobile device operating systems competing for market share with established ones for some time to come, building native apps will still involve targeting multiple platforms, even as the focus for developers shifts from individual phones to mobile platforms.

**Figure 1** Mobile Architecture Must Be Comprehensive Across User Bases

**1-1 Three mobile constituencies have different architectural needs**



**1-2 Key mobile application population segments**

	Time mobile (away from device/service desk)	Who typically pays for device/service plan	Endpoint types	Typical application	Application approach
Information worker	Two to three days per week	Individual or split liability	Highly capable mobile devices (smartphones) e.g., Windows Mobile, BlackBerry, Symbian, iPhone devices	Voice, UC, email, calendar personal information management (PIM)/ contacts, expense reports, business unit dashboards	Some browser-based (e.g., expense apps), some non-browser-based (e.g., email)
Task worker	Four to five days per week	Corporation	Ruggedized and capable mobile devices, e.g., Windows Mobile, BlackBerry, Symbian, Nextel devices, custom devices	• Fleet management, direct store delivery, smart utility, pipeline integrity • High industry dependence	Typically always non-browser-based; thick application needs to be operational even in low-connectivity areas
Customers	Constant	Individual	Any type of low, medium and high-end phone/device	Mobile marketing, high-net worth individual apps for financial service firms, travel apps, news/entertainment apps	Browser-based generally; some non-browser apps for specific apps — like high-network field service apps

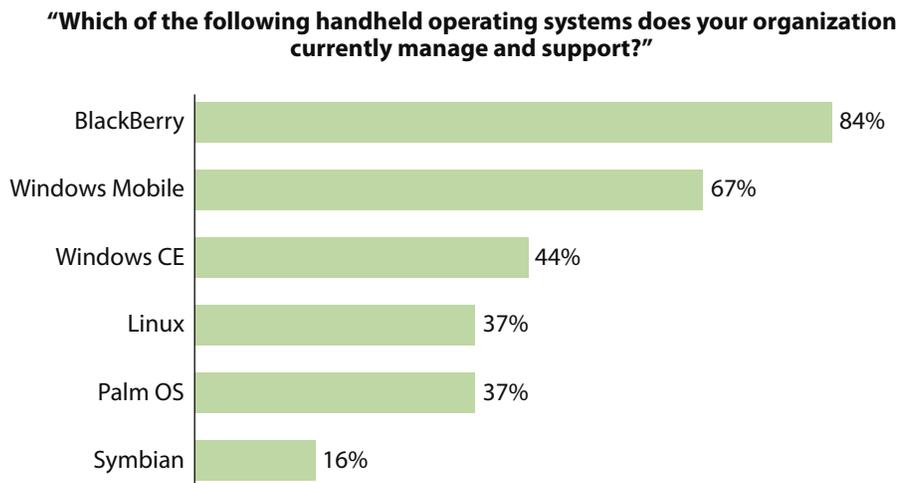
### Mobility Has Percolated Below The Surface . . .

Today's mobile application development tools and middleware stacks are a mixed blessing. They've gotten the job done, but they've created a separate world dedicated to mobility and made it difficult for architects to fit them into an end-to-end platform strategy. The truth about mobility today?

- **Broad firm adoption of wireless email — but little control and diversity.** Forrester's 2008 Business Data Services data reports that 95% of enterprises have deployed or at least evaluated wireless email.<sup>3</sup> But this hides a paradox: Of those 95% of firms, Forrester estimates that on average less than 5% of any firms' employees actually use wireless email. Why? Sure, there is debate over who pays for the service plan, but just as importantly, there is also concern from the IT department that it can't secure corporate data on the broad spectrum of devices that employees want — like the iPhone and BlackJack II that they may get from their national carrier's local retail outlet. This means that only a thin veneer of "authorized" employees get access to wireless email through a corporate-sanctioned device or, in rare circumstances where executives insist, their own device.<sup>4</sup>
- **Only niche deployment of mobile applications for employees, partners, or customers.** For the past three years, mobile line-of-business (LOB) application adoption — such as mobile sales force automation (SFA), field service, or inventory management — has inched along. While these LOB applications are heavily industry-specific — which means they won't have broad adoption — even cross-industry apps, such as mobile SFA, have been deployed in about one-third of firms.<sup>5</sup> And those who are deploying tend to do so with packaged apps: The Forrester/1105 Media June 2007 North American IDE Usage Online Survey showed that only 13% of application development professionals say that they are developing custom mobile apps. While there is interest in consumer applications — 40% of enterprises say that they are trialing customer-facing mobile applications, such as the ability to book a flight on a mobile device — there are only limited deployments, except in mobile sites for news or entertainment.<sup>6</sup>
- **Overwhelming device — and development — diversity.** Let's face it, not only are there a multitude of device hardware vendors — such as Samsung, Nokia, Motorola, HTC, and now Apple — there are also a host of mobile operating systems — Symbian, Windows Mobile, BlackBerry, and now Linux and Mac OS X (see Figure 2).<sup>7</sup> This creates a headache for IT when deciding which devices to support. It's even worse for the architect tasked with deploying a custom mobile application. While it's relatively easy to support apps for field service workers who use sanctioned corporate-purchased devices of all the same type, it's an entirely different matter to think about developing apps that employees can access from their diverse individual devices — such as mobile expense submissions. And what about customer-facing applications? It's a hard truth that developing for multiple devices usually requires individual development, porting, and testing efforts for each device or mobile operating system. Even when a cross-platform option like Java Platform Micro Edition (Java ME) is used, developers will often still need to plan individual porting efforts to resolve inconsistencies in device-specific application program interfaces (APIs).

- Lack of mobile Web standards.** Web development is the right path for developers creating apps for customers or information workers who want to use their own devices. But when it comes to traditional mobile Web development, shops that build mobile sites don't have much good to say about their options; WAP/XHTML-MP simply hasn't kept pace with full Internet standards. Mainstream Web sites use Ajax, Cascading Style Sheets (CSS), and rich media browser plug-ins like Adobe's Flash and Microsoft's Silverlight to improve user experience and responsiveness, but in the process they leave the mobile Web far behind. And even though XHTML-MP, Mobile CSS, and JavaScript MP are subsets of their fully specified cousins and are designed to make mobile Web development approachable, in practice, Forrester has found that large Web shops still tend to concentrate development within dedicated teams or outsource it to specialist firms entirely.

**Figure 2** Today's Device Landscape Is Fragmented



Base: 243 North American and European enterprise decision-makers responsible for mobile technologies and services (multiple responses accepted)

Source: Enterprise And SMB Networks And Telecommunications Survey, North America And Europe, Q1 2008

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Source: Forrester Research, Inc.

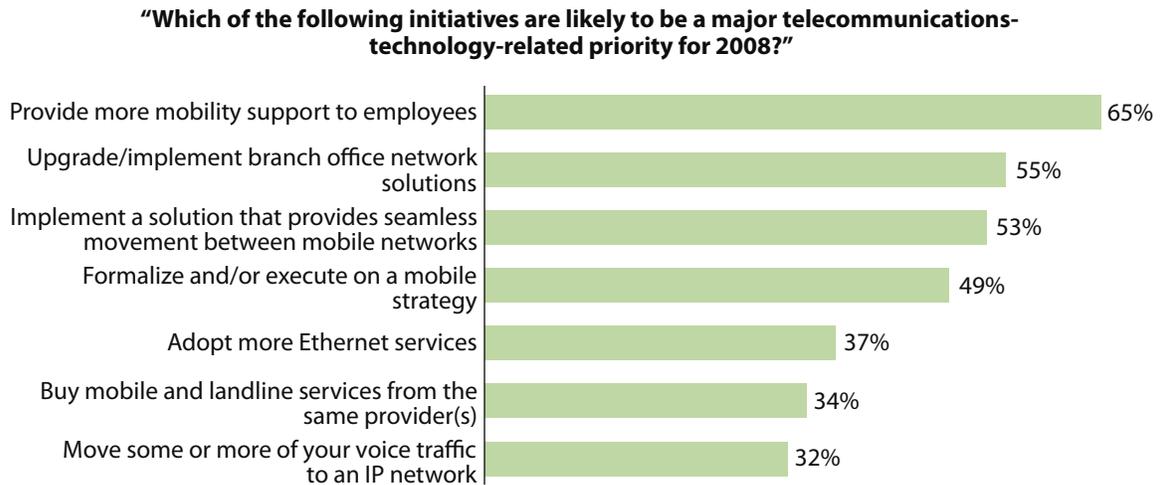
### ... But Technology Advances And Mobile App Demand Bumps Mobility To A Priority In 2008

If mobility is lost in its own fragmented world, why should it register as more than a blip on an enterprise architecture professional's radar screen? While progress in the mobile space has moved in fits and starts, basic hardware and network capabilities are now largely in place — more importantly, firms report it as a priority. Today, providing more mobility support to employees ranks as one of the top telecom and IT initiatives, and almost half of enterprises tell us that formalizing and executing on a mobile strategy — that contains architectural frameworks for mobility — is a priority (see Figure 3). Mobility can't be ignored anymore in the face of:

- **More wireless network interest and use.** Fifty-six percent of enterprises use a wireless local area network (WLAN) today, with another 36% evaluating or piloting. In the past year, enterprise and small and medium-size business (SMB) interest and use of public cellular data has jumped 16%.<sup>8</sup> The network has big implications in application architecture. If an application is being used in a pervasive 802.11 environment like a hospital, the application — a clinical nursing app, for example — can be thin-client- and browser-based. But wide-area use cases coverage and spotty high-speed networks demand an architecture that allows for intermittent connectivity, which means an application needs enough business logic on the device so that it can work even when it is occasionally connected.
- **More mobile application interest and use — and higher expectation from developers.** Five years ago, firms were asking Forrester basic mobility questions about wireless networking and its security; today, inquiries have moved up the stack into the architects' domain and revolve around the security of the data itself, devices, and the applications that are deployed on them.<sup>9</sup> Further, we are receiving questions from application development professionals who are now grading their traditional vendors on mobile capabilities — with the expectations that mobile devices should be just another interaction channel in their application platform.<sup>10</sup> This attitude is further reinforced as rich Internet applications technologies go mobile and in the process poke holes in the walls that have traditionally separated mobile application architectures from application platform and Web architectures.
- **More capable devices.** Devices like the Apple iPhone or the Nokia N95 have full-featured Internet browsers and support rich media codecs. As a result, Web developers are eyeing these more capable devices as part of an extended Web development strategy. And it's not just social networking sites like YouTube and Pandora; it's also enterprise software vendors like salesforce.com and Oracle that are forcing the issue by extending their application platforms to include these devices as target clients.<sup>11</sup> The iPhone is not where it ends; these devices represent the vanguard of devices that will have similar capabilities. Many of these devices will include browsers based on WebKit, including devices that use Nokia Symbian S60 3rd Edition, Open Handset Alliance Android, and the LiMo Foundation's LiMo. The net result is that over the next few years, the highly fragmented mobile browser market will begin to settle out as regular Web developers target fully capable browsers like Opera Mini and Internet Explorer (IE) Mobile and those based on WebKit.
- **More groundswell demand — and risk.** Employees, used to a high degree of mobility in their own consumer life, are bringing their devices in and demanding them to be connected to corporate networks (see Figure 4). Forrester calls this Technology Populism, the phenomena of employees leveraging technology in their personal lives, such as mobile devices, at work.<sup>12</sup> In contrast to years prior, many firms are not locking these devices out but rather are working to define the architectural framework to secure them and not compromise sensitive data. The problem? A larger and more dispersed set of corporate assets that make adherence

to compliance like Sarbanes-Oxley (SOX), Payment Card Industry (PCI), and the Health Insurance Portability and Accountability Act (HIPAA) a nightmare for IT and risk officers.

**Figure 3** Mobility Tops Priority Lists In 2008



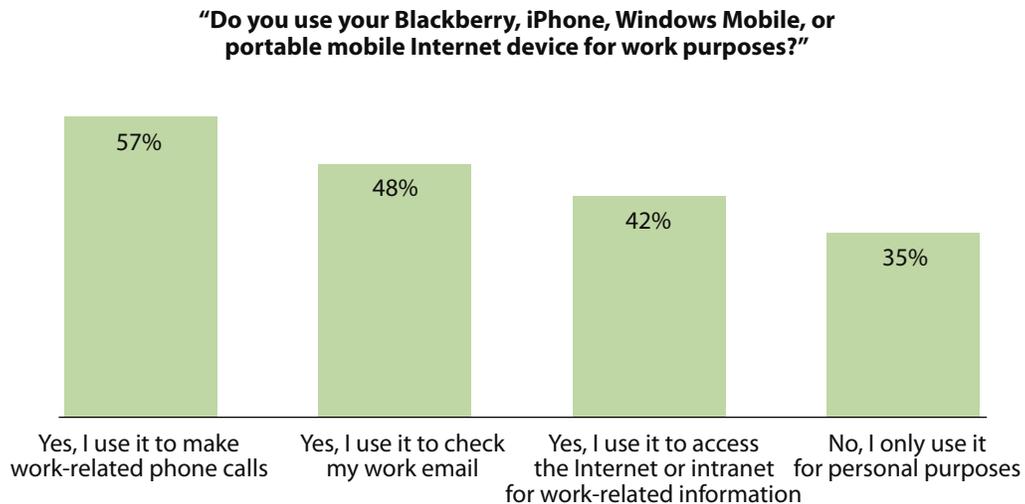
Base: 995 North American and European enterprise telecom decision-makers

Source: Enterprise And SMB Networks And Telecommunications Survey, North America And Europe, Q1 2008

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Source: Forrester Research, Inc.

**Figure 4** Many Consumers Use Their Mobile Devices For Business Purposes



Base: US online adults with a full- or part-time job who own a smartphone (multiple responses accepted)

Source: North American Technographics® Consumer Software And Home Office Online Survey, Q1 2008

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Source: Forrester Research, Inc.

## TWO MOBILE ARCHITECTURES EMERGE FOR TODAY AND TOMORROW

A comprehensive mobile architecture — one that moves beyond just policy and includes a technology approach — must provide the basis for mobile application development whether for partners, customers, or employees. This is critical to realizing the benefits of mobility as well as its costs. One large energy firm that we spoke with emphasized the need for an architectural strategy that supported all types of mobile development and integration across employees, partners, and customers and had a list of more than 90 applications to be mobilized in the next year. Enterprise architects must support two mobile architectures (see Figure 5):

- **Thin architectures.** Usually browser-based, this architecture is used when writing once and deploying to many disparate devices. These applications fall into three use cases: a) task worker apps on firm-sanctioned devices over a pervasive WLAN network, such as a pick-list mobile application in a warehouse; b) information worker apps on a variety of personal or firm-sanctioned devices over a cellular or Wi-Fi/WLAN network, such as access to an Intranet; and c) consumer applications on any type of device over a cellular or Wi-Fi/WLAN network, such as music access or a news site for consumers or a coupon application for teen apparel.
- **Thick architectures.** These architectures leverage a native application and storage on the mobile device that leverages the network when available but still functions when it is not. For example, wireless email on a Blackberry is a thick architecture — when on a plane you can still write an email, but it's not sent till the network is available. Thick architectures are typically used for: a) task worker apps on firm-sanctioned devices over a cellular or wide-area network (WAN), such as a police mobile app that allows driver license lookup that the San Jose police department is trialing; and b) specialized consumer applications developed for (usually) higher-end devices, such as a bank creating a personal account portfolio app for high net-worth individuals.

**Figure 5** Thin Versus Thick Architecture Approaches

	Thin mobile architecture	Thick mobile architecture
Platform	<ul style="list-style-type: none"> <li>• <b>Mobile browsers:</b> More than 40 options</li> <li>• <b>Full browser:</b> WebKit, Opera Mobile, Mozilla Fennec, Internet Explorer Mobile</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mobile OS:</b> Windows Mobile, BlackBerry OS, Symbian OS, Android, Linux Mobile (LiMo), iPhone OS</li> </ul>
Client-side user interface technologies	<ul style="list-style-type: none"> <li>• <b>Mobile Internet:</b> XHTML-MP, ECMAScript Compact Profile, Adobe Flash Lite</li> <li>• <b>Full Internet:</b> HTML 4.01, XHTML 1.0, JavaScript 1.x</li> <li>• <b>Rich Internet:</b> Flash, Silverlight, Ajax frameworks</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Device/OS specific:</b> Xcode/Cocoa, C++, .NET Compact Framework</li> <li>• <b>OS independent:</b> Java/Java Platform Micro Edition</li> </ul>
Server-side integration	<ul style="list-style-type: none"> <li>• <b>HTML Server:</b> Apache Tomcat, Internet Information Services (IIS)</li> <li>• <b>Application Server:</b> Tomcat, Java Platform Enterprise Edition</li> <li>• <b>SOA:</b> RESTful Web Services</li> </ul>	Specialized mobile middleware or via extensions in enterprise application packages
Development tools	Web development and testing tools, browser plug-ins	Visual Studio, Eclipse, NetBeans, specialized mobile middleware IDEs

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Source: Forrester Research, Inc.

### THIN MOBILE ARCHITECTURES ALLOW APPS TO REACH A HOST OF CONSUMER DEVICES

Developers of mobile applications aren't that different from developers of regular applications — they crave development tools that are easy to use and support the platforms they want to deploy their applications on.<sup>13</sup> This is one reason why thin mobile architectures are so appealing: Thin apps allow developers to apply skills and tools they already know from years of Web development. Here's how the architecture of thin mobile applications will come together as fully capable browsers reach mobile devices — and as wireless networks become more pervasive:

- **Client-side components will simply use existing browser standards.** As mobile browsers on smartphones give way to fully capable browsers, enterprise architects can begin to phase out support for limited mobile standards like XHTML-MP and JavaScript MP in favor of full Internet standards like HTML 4.01, CSS 2.x/3.x, and JavaScript 1.4. But it's important to consider the user base for the application in question before cutting over to a full Internet client. Sure, if the target users are information or task workers whose devices are purchased by the firm, it's easy to anticipate the right time to cut over to a full Internet client as the firm will likely upgrade to capable devices en masse. But if you are targeting a large, diverse customer base or information workers who are bringing their devices in from home, there is little control over what device — much less what browser — exists. And even with today's smartphones, full support for popular Ajax libraries that your Web developer may be using is still evolving, so it's

wise to test existing Web sites and make slight tweaks where needed to optimize existing sites for mobile browsers before taking the full Internet plunge.<sup>14</sup>

- **Integration with server-side components will follow established architectural patterns.** As mobile sites shift over from specialized .mobi domains to mainline sites, integration of the browser side HTML and JavaScript with server-side components will simply follow standard conventions. And with support for XMLHttpRequest (XHR) objects, mainline sites can pass XML, JavaScript Object Notation (JSON), or even plain text to mobile browsers the same way they do to their desktop cousins. Given the relative processing power of mobile devices, enterprise architects should look to use RESTful architectures when hooking up clients to Web service APIs as opposed to a Simple Object Access Protocol (SOAP)-based approach that would require specialized message processing on the client.
- **Specialized mobile development tools won't be needed.** Developers that are optimizing existing sites for mobile browsing find that their existing Web development tools are generally up to the task. Many developers use text editors and in-browser plug-ins like Firebug for Firefox or Dragonfly for Opera to debug their applications. Others use specialized Web development tools like Aptana Studio that include plug-ins for building iPhone Web applications.<sup>15</sup> The bottom line: As mobile Web applications converge with the full Internet, the need for proprietary, specialized (and expensive) development tools will evaporate.

While thin mobile architectures will make life easier for developers, they won't do much to solve device management and security issues. Furthermore, RESTful messaging architectures are most appropriate for resource-based architectures; they aren't necessarily good at handling long-running transactions where state needs to be maintained, especially in a situation where connectivity may be intermittent. This architecture makes mobile Web applications most suitable for situations where enterprise architects need to broadcast information to a wide variety of users, especially customers.

### A Divide Will Emerge Between Browsers And Plug-Ins

Over the next 18 months, browser-based thin mobile apps will gain sway as a wave of new devices with one or more standards-compliant browsers hit the market. But, browser-based apps won't be the only thin client option. And as multiple browsers compete for share in the mobile market, enterprise architects will need to stay on top of the players:

- **Four browsers will compete for the mobile market.** WebKit has been on a roll over the past year, but it's not the only option. Opera Mobile also boasts support for full Internet standards and is available on multiple mobile operating systems, including Symbian and Windows Mobile. Architects should also track the next version of Microsoft IE Mobile, which will be based on the same code base as Internet Explorer.<sup>16</sup> And then there's the Mozilla team, which is working on a mobile browser codenamed "Fennec" that's slated for release in 2009.<sup>17</sup> Assuming all parties execute to plan, next year will see a wealth of browser choice for mobile users, and enterprise architecture pros will need to plan accordingly.

- **Rich media platforms will provide an alternative deployment option.** While Ajax frameworks in browsers deliver a relatively rich user experience, they have limits. If application developers need vector-based graphics or rich media capabilities, they have typically turned to browser plug-ins like Adobe Flash and Microsoft Silverlight. In March of 2008, Nokia announced plans to support Silverlight on Symbian S60 and S40 devices, and Adobe recently restructured its development teams to align mobile development of Flash with its desktop efforts. Expect both to go mobile with fully featured rich media plug-ins by 2011. They'll be joined by Sun Microsystems with JavaFX, giving enterprise architects at least three choices for rich mobile Internet applications.

Although rich media options will offer consistent platforms across multiple operating systems and will plug into thin mobile apps, it is likely that their on-device capabilities will allow some least common denominator integration with on-device capabilities, turning them into an option that bridges thin and thick mobile architectures.

#### THICK MOBILE ARCHITECTURES BRING FULL FIRM CAPABILITIES ANYWHERE

Thick mobile architectures have been the bane of many IT professionals. Unique device OSes, lack of control as they roam within and outside the corporation's four walls, and a rapidly changing landscape makes this architecture difficult. Firms struggle with a "write-once, deploy-to-many" landscape as well as with the device management, security, and integration issues. For thick applications, enterprise architects must solve three problems found in typical IT architectures — but in a much more complex way. They need:

- **Development tools that abstract mobile platforms.** Thick mobile applications are more complex to develop than thin ones, so it's imperative that thick client development tools abstract the added complexity of multiple mobile operating systems, languages, and programming frameworks. These tools generally ease cross-platform development by taking a model-driven approach, where a developer designs the mobile application at an abstract level, and then the tool generates the application for specific mobile operating systems or devices.
- **Server-side components that integrate and synchronize key corporate data.** Core to any successful mobile application is the integration of data with back-end systems. Whether this is a custom-bred app that a utility firm had developed for its meter-reading folks or an extension of an enterprise resource planning (ERP) accounting app, data synchronization and master/slave rules must be defined. While many back-end systems don't allow direct integration into their database, they often provide interfaces through service-oriented architecture (SOA) or custom application programming interfaces (APIs).
- **Device management and security.** Key to opening the flood gates of mobile adoption in enterprises on intermittently available networks are security approaches that give the CIO and

CFO confidence in deploying thick apps that may house customer-sensitive information or are in accordance with SOX and ensure the discoverable data on the device is audited and archived. Mobile device management helps automate tasks like device configuration, software distribution, backup and restore, and asset management — it also helps to manage security on the device like password authentication, remote kill, and sometimes device encryption.<sup>18</sup>

### An Unruly Vendor Landscape Exists Today

The past eight years have created an unruly vendor landscape with vendors that offer some or all of the elements needed for a mobile architecture framework. These vendors typically do only a part of the job modestly well — but often just for a specific type of device or architecture — creating a large Twister game of device, integration, management, and application dependencies. These vendors include (see Figure 6):

- **Wireless email providers.** Most firms' first foray into mobility has typically been wireless email and personal information management like contacts and calendars (except for early mobile applications in industries that have a lot of field workers, such as the car rental business). This means that the wireless email vendors — Research In Motion (RIM), Motorola's Good, and Nokia's Intellisync have been first to the party to go beyond just wireless email. They all have products (or soon-to-be products) that provide integration to back-end systems and integrated development environments (IDEs) to develop applications. For example, RIM's mobile delivery service (MDS) allows development for BlackBerry devices using a modified Java 2 Platform, Micro Edition (J2ME) approach. Complicating matters further, email providers, such as Microsoft, now offer direct wireless email capabilities and also some rudimentary management capabilities for devices beyond just Windows Mobile, including the second generation of the iPhone when it ships next month.<sup>19</sup> These vendors know wireless email well and, in some cases, such as RIM with MDS, have a relatively sophisticated product that often works for just one type of device, for example, RIM only with BlackBerry.
- **Packaged application vendors.** Early on, packaged application vendors thought all they had to do was cram their full-screen capabilities into a 4-inch x 6-inch device. This failed miserably, and, in response, dedicated mobile application vendors were able to answer the mail for firms that wanted usable mobile apps. Today, with mobility rising in importance, packaged app vendors are back on the scene with invigorated offerings — such as SAP's xApps and recent integration with RIM and last year's salesforce.com acquisition of Sendia.<sup>20</sup> These vendors have the advantage of providing seamless integration with their system, typically provide an IDE or way to customize the offerings, and often work across the popular high-end mobile OS Windows Mobile. The downside? They usually mobilize only their own software or application: This creates a problem for mobile workers who want access to multiple applications on their handheld. It's worse for architects who need holistic frameworks to manage and control all mobile apps to prove that they are minimizing risk — and not have mobility as an additional distribution channel within a myriad of enterprise applications that often have simplistic device management capabilities, if any.

- **Pure-play mobile app vendors.** The past eight years have seen the rise of a host of industry- and app-specific mobility players — such as Pyxis Mobile for mobile financial service workers and @Road for mobile field service workers. These vendors typically have great user experiences and can elevate utilization of a mobile app — typically an early concern of firms adopting a mobile application — and often provide IDEs for customization. Most of these vendors, such as Antenna Software and Dexterra, have relatively sophisticated platforms that can be extended to integrate with more back-end systems than the ones they are currently marketing to. After mobility failed to progress, many early mobile platform vendors found success in providing one mobile application very well rather than offering a generic platform for firms to deploy on. These vendors usually get the user interface the best of any other players — and their underlying platforms deserve a second look to see if they can be applied holistically as a mobile architecture to meet any need. However, they typically offer only the most rudimentary device management capabilities.
- **Mobile middleware vendors.** This class of software was hyped hugely back in 2000 — and it is facing a revival of interest by enterprise architects in some situations where a host of thick mobile architectures are anticipated across a diversity of devices. Mobile middleware vendors like Sybase iAnywhere, and now Dexterra and Antenna Software, provide infrastructure that allows integration across many back-end systems. Some mobile middleware providers also provide “what you see is what you get” (WYSIWYG) tools like Dexterra Composer and Antenna Software AMP Studio that plug into leading IDEs like Eclipse and Visual Studio. These vendors usually offer mobile device management capabilities or components that support application distribution management over-the-air (OTA), asset management, and security — such as remote kill or device password authentication (e.g., Sybase iAnywhere’s Afaria or Nokia’s Intellisync). Architects are increasingly turning to these vendors for an architecture that can manage a host of thick client approaches across a wide range of devices and networks.

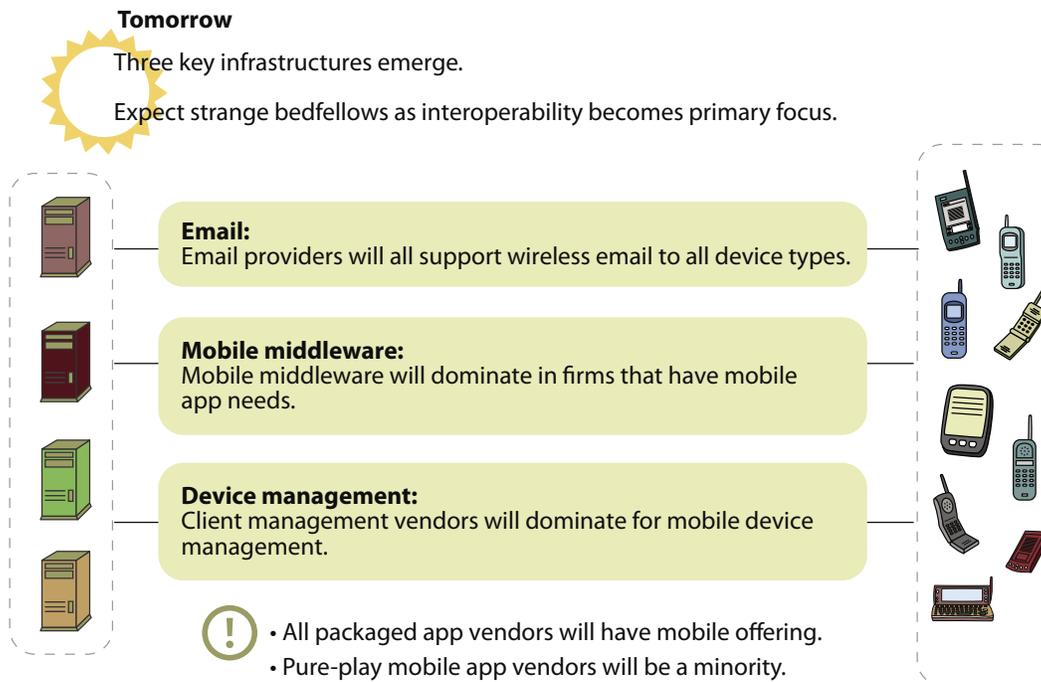
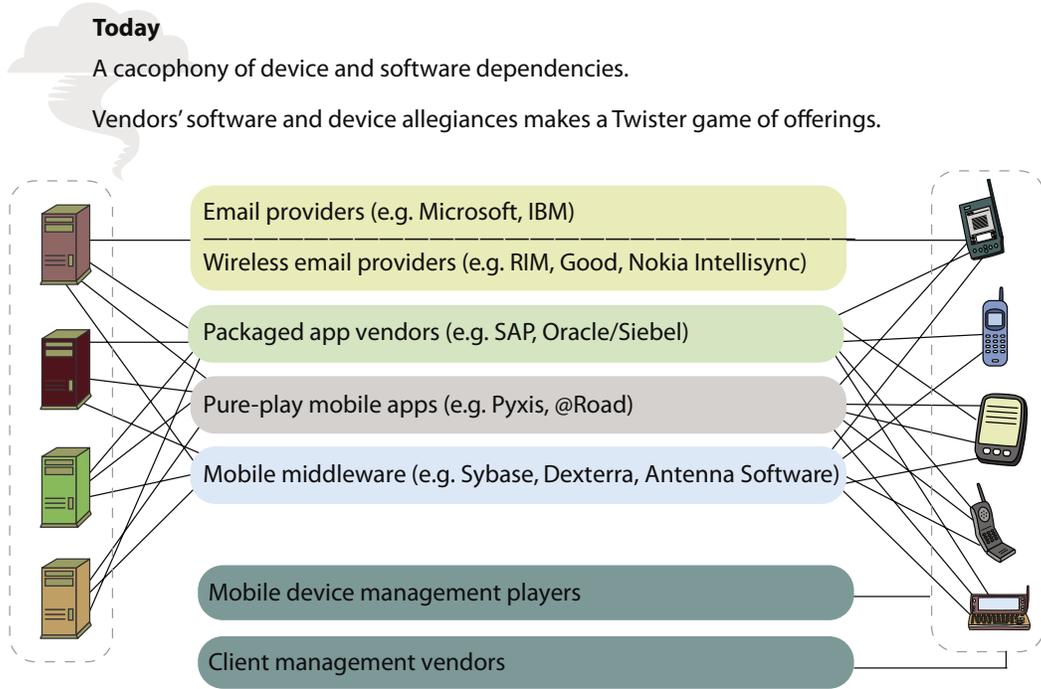
Adding murkiness to an already confused market, a host of vendors are providing just mobile device management tools, but these don’t typically address development or integration.

- **Pure-play mobile device management vendors.** There are dozens of mobile device management and security vendors like Excitor, Mformation Technologies, and SOTI (to name just a few). This is in addition to the mobile middleware suites described above that have subcomponents that can be purchased individually from the suite — such as Motorola’s Good Mobility Suite, Nokia’s Intellisync Mobile Suite, and Sybase iAnywhere’s Afaria — to provide full mobile device management capabilities across a range of device types and OSes. These pure-plays do a great job of holistic device management for organizations that either haven’t successfully standardized their mobile client environments or have embraced Technology Populism in the handheld realm.

- **Traditional client management vendors.** Almost all major client management suite vendors have incorporated support for handhelds that integrate well with their management suites across a wide range of desktops and laptops. Examples include BMC Software's Marimba Client Management, CA's Mobile Device Management, IBM's Tivoli Smart Handheld Device Manager, LANDesk's Handheld and Embedded Device Manager, and Microsoft's System Center Mobile Device Manager 2008. These tools' mobile device management capabilities are still fairly rudimentary and limited to just a subset of mobile OSes, but it's a nice add-on for organizations looking to manage their handhelds through the same console that they already use to manage their desktops and laptops.

Forrester anticipates more consolidation in the next few years and believes that mobile middleware will become more prevalent in large firms that have a litany of thick mobile applications to deploy over wide area wireless networks for employees, partners, and customers — but won't necessarily become a necessary infrastructure in the majority of firms.

**Figure 6** Many Types Of Vendors Offer Mobile Thick Client Solutions



## DEVELOPING YOUR MOBILE ARCHITECTURE STRATEGY

Over the next few years, you'll be asked to arrive at a mobile architecture that addresses all the possibilities of writing applications to an ever-increasing host of devices, networks, and people. Key questions to answer over the next three years as you develop your mobile architecture — and decide which products to invest in — are:

- **Who are going to be the users — and use cases — of mobility?** Today it may be field service employees or the thin veneer of executives asking for a mobile dashboard app. Tomorrow it may be a customer. A clear understanding of the users and their use cases, today and anticipated, is paramount. Which networks will they work over? If it's all WLAN, you won't need a sophisticated mobile middleware product to create a thick client; if it's a wide-band wireless LAN (WWLAN) network, however, you probably will. Are your users tech-savvy? If not, they'll need to really focus on simplifying the user interface. What about your customers? Do you anticipate them interacting over a mobile device in the next three years? If so, you'll want a thin client architecture.
- **What are the applications you need mobilized today and tomorrow?** It's hard to speculate out too far in the future, but survey your internal customers and ask what they expect over the next three years. Answer these questions: Are others in your industry identifying mobile apps for their customers or employees? Are the applications going to use data that is sensitive? Have you considered mobile unified communications and collaboration apps — the next big thing? What business processes take place on-the-go, and is there an opportunity to improve them?
- **What devices will you support today and tomorrow?** Even though every fiber in your body wants to standardize on a mobile device OS — just as you probably have with Windows on PCs — you won't be able to on handhelds. Identify which devices OSes you will support for your information and task workers. We may all debate who wins in the end, but for at least the next five years, you will have to support a multitude of devices. Plan for Windows Mobile, BlackBerry, iPhone (as it becomes more enterprise-ready), and Symbian — particularly in European markets.
- **What are your development standards and tools?** As mobile architectures converge with your overall application platform strategy, development tools will follow suit. The relative proportion of thick client mobile applications to thin mobile apps should determine how you work with application development professionals to make sure that the right skills are in place. If you are developing mostly thin mobile applications, then look to take advantage of low-cost, standardized Web development tools and rich Internet application (RIA) frameworks. For thicker mobile applications, look for development tool plug-ins that are purpose-built as components of complete mobile middleware offerings — and make sure that development tool capability is one of the key evaluation points of any solution that you select.

- **Who is going to pay for devices and services?** As mobility becomes more pervasive, there will be heavy lobbying by employees for employers to pay for wireless data services and plans — particularly as personal devices increasingly become work devices. Ensure that your strategy sets out specific plans (although they may change) on which job types get corporate devices and which employees get their service plans paid for.

## RECOMMENDATIONS

### DEFINE YOUR USER'S NEEDS, THEN PLAN TACTICS AND STRATEGY

Enterprise architecture professionals won't have an easy time putting in place a definitive mobility strategy over the next few years. Taking full advantage of the coming shifts in infrastructure and device capability will require you to keep a close eye on the market and have a clear understanding of your year-to-year tactics, as well as how they will align with a longer-term mobile application strategy. But the best way to get started is to define which user types you are targeting and with what applications. Then:

- **Use thin mobile applications to reach customers.** You'll have the least control over the devices your customers use, and, unless you cater exclusively to affluent consumers, business users, or technology optimists, you'll need to wait for at least one more generation of phones before you can abandon mobile Web standards. But, as more and more consumers turn their phones over in the next three years and increasingly use cellular data services, give developers the freedom to experiment with richer full Internet apps rendered by next-generation mobile browsers built on existing Web standards.
- **Use mobile middleware providers to support task workers . . .** Task workers dependent on applications and using them over wide-area high-speed data networks (not pervasive WLAN networks) need on-device capabilities that make their apps work when they aren't connected. Mobile middleware providers are ideal to use to support the development, integration, and mobile device management.
- **. . . and information workers in the near term.** Information workers working over wide-area wireless networks are likelier to carry a diversity of smartphones. The ideal architecture is a thin one that lets the browser abstract device dependencies — assuming the application does not have to be available even without connectivity. However, because fully capable browsers and rich Internet plug-ins are still in early stages of release, you still have to support multiple browsers across all the different mobile operating systems. As a result, it's still a bit too early to adopt a full Internet-enabled thin mobile architecture for these information-hungry users. A good near-term approach is to leverage mobile middleware products in the short term but reevaluate your options and the maturity of full Internet support and more pervasive wireless data networks on smart devices on a yearly basis.

## WHAT IT MEANS

## IMPROVED CAPABILITY WILL PUSH MOBILE DEVICES OVER THE TOP

A perfect storm of devices that are more capable; networks that provide faster, more pervasive access; better software; and improved management capabilities will result in mobile devices taking an important place as a key interaction channel alongside the PC desktop and the Internet browser. Accordingly, it should be no surprise that industry titans — telecom, hardware, software, and Internet — will compete mightily to secure a dominant position as part of the stack that will engage users in the most intimate and constant way. The evolution of the mobile screen will have industrywide ramifications. For example:

- **Mobile devices will be a key front in the second browser battle.** As users increase their use of mobile browsers, it will be natural for them to want a consistent user experience on the desktop and their mobile devices. Expect Microsoft, Mozilla, Apple, Adobe Systems, and Opera Software to compete vigorously across mobile and desktop devices with a slew of new innovative features and a focus on performance and browser footprint. But, similar to the Internet and PC revolution, don't expect purely thin client or cloud applications. Networks will be spotty for years to come, and some applications will always require thick architectures.
- **Thin mobile development tools will commoditize, and more apps will result.** As desktop Internet standards take over, thin mobile architectures will follow the same path that they've taken for desktop browser apps: They'll get easier to build, and the development tools will get cheaper and easier to use. This in turn will make thin mobile application development more approachable, which will lead to a larger development community and, eventually, to more thin mobile applications.

## SUPPLEMENTAL MATERIAL

## Companies Interviewed For This Document

Antenna Software	Gearworks
Avaya	General Motors
Compuware	Progress Energy
Delta Air Lines	Research In Motion (RIM)
Dexterra	Safeway
Electronic Data Systems (EDS)	Sybase
Exxon Mobil	Vetro

## ENDNOTES

- <sup>1</sup> Forrester defines enterprise mobility as “The ability for an enterprise to connect and control suppliers, partners, employees, assets, products, and customers from any location.” See the May 23, 2005, “[The Mobile Enterprise Warms Up](#)” report.
- <sup>2</sup> Significant VC funding came into mobile middleware startups like Brience and Aether Systems.
- <sup>3</sup> Forrester’s Enterprise And SMB Networks And Telecommunications Survey, North America And Europe, Q1 2008 reports that 65% of enterprises are fully deployed or have an upgrade underway, 16% are rolling out or in partial deployment, 15% are evaluating or piloting, and 5% have no plans or answered “don’t know.” See the June 13, 2008, “[The State Of Enterprise Networks And Telecommunications: 2008](#)” report.
- <sup>4</sup> Most firms in the US support BlackBerry and Windows Mobile for wireless email. In Europe and Asia, many firms are supporting BlackBerry, Windows Mobile, and Symbian.
- <sup>5</sup> Level of interest and deployment of mobile line-of-business applications, including sales force applications vary by region. See the April 7, 2008, “[The Global Mobile Application Landscape](#)” report.
- <sup>6</sup> Forrester’s 2008 networks and telecommunications survey reports that 12% of firms (enterprises and SMBs) report formalizing or executing on a mobile strategy is a critical priority, 31% cite it as a priority, and 20% said that they already have done it. Only 14% say that they don’t have plans or don’t know. Source: Enterprise And SMB Networks And Telecommunications Survey, North America And Europe, Q1 2008.
- <sup>7</sup> On November 5, 2007, Google, together with a congress of mobile operators, handset makers, software vendors, and others dubbed the Open Handset Alliance, unveiled a mobile device software platform called Android. See the November 6, 2007, “[Google Bootstraps An ‘Open’ Mobile Platform](#)” report.
- <sup>8</sup> Forrester’s Enterprise And SMB Networks And Telecommunications Survey, North America And Europe, Q1 2008, reports that 42% of firms are very or somewhat interested in public cellular data. See the June 13, 2008, “[The State Of Enterprise Networks And Telecommunications: 2008](#)” report and see the May 3, 2007, “[The State Of Enterprise Network And Telecommunications Adoption: 2007](#)” report.
- <sup>9</sup> Forrester has seen a jump in the past year in inquiries about devices and mobile strategies, as well as in the number of questions received from firms interested in deploying more than one mobile application. In addition, we are seeing the role of the individuals asking these questions slowly shifting from enterprise architects to business strategists, as enterprise mobility becomes more systemic to firms. See the March 4, 2008, “[Inquiry Insights: Enterprise Mobility, Q1 2008](#)” report.
- <sup>10</sup> This evolution in developer attitudes is simply another evolutionary step in thinking about applications that use consistent services to deliver information to multiple user interface channels. See the January 31, 2006, “[The Interaction Platform: Widespread In 2006](#)” report.
- <sup>11</sup> Thin mobile applications combined with the iPhone are becoming somewhat obligatory on the demo circuit. For example, at JavaOne 2008, Oracle demonstrated how developers that use the Oracle Application Development Framework (ADF) can deploy an app to the iPhone merely by selecting a few properties in JDeveloper and rebuilding the application. Last year at DreamForce 07, salesforce.com also demonstrated this with mobile apps accessing salesforce.com data.

- <sup>12</sup> Forrester defines Technology Populism as an adoption trend led by a technology-native workforce that self-provisions collaborative tools, information sources, and human networks — requiring minimal or no ongoing support from a central IT organization. See the February 22, 2008, “[Embrace The Risks And Rewards Of Technology Populism](#)” report.
- <sup>13</sup> Forrester surveyed 703 application development professionals who subscribe to 1105 Media’s .NET or Java newsletters and are actively involved in .NET or Java development to understand their IDE usage patterns and attitudes toward open source. These developers said ease of use and platforms support were the most important criteria in choosing an IDE. See the February 12, 2008, “[IDE Usage Trends](#)” report.
- <sup>14</sup> For more information about the types of adjustments thin mobile applications developers will need to make for the iPhone, refer to Apple’s guide for Mobile Safari development. Source: “Web Development Guidelines for iPhone,” Apple (<https://developer.apple.com/webapps/>).
- <sup>15</sup> An IBM developerWorks guide describes how developers can create iPhone Web applications using Eclipse, Aptana Studio, and the iUI Ajax framework. Source: Adam Houghton, “Develop iPhone Web applications with Eclipse,” *IBM developerWorks*, January 29, 2008 (<http://www.ibm.com/developerworks/opensource/library/os-eclipse-iphone/>).
- <sup>16</sup> At this year’s CTIA Wireless 2008 conference in Las Vegas, Microsoft took the wraps off of the pending version of IE Mobile, due out sometime around the end of the year. Source: “Microsoft revamps Internet Explorer Mobile with Windows Mobile 6.1 - more changes in store this year,” *IntoMobile*, April 2, 2008 (<http://www.intomobile.com/2008/04/02/microsoft-revamps-internet-explorer-mobile-with-windows-mobile-61-more-changes-in-store-this-year.html>).
- <sup>17</sup> “Fennec” is part of Mozilla’s Firefox 4 efforts. Source: Paula Rooney, “Mobile Firefox ‘Fennec’ critical to maintaining Mozilla’s momentum,” *Linux and Open Source*, ZDNet, June 19, 2008 (<http://blogs.zdnet.com/open-source/?p=2573>).
- <sup>18</sup> Because mobile device management means different things to different roles within a business, there’s a lot of confusion in the market today. See the April 18, 2008, “[Answering The Most Frequently Asked Mobile Device Questions](#)” report.
- <sup>19</sup> Pushing wireless email from Microsoft Exchange requires Exchange 2007 SP2 with Windows Mobile 5 (with the Messaging and Security Feature Pack [MSFP]) or Windows Mobile 6.
- <sup>20</sup> On May 2, 2008, SAP and RIM announced a co-innovation partnership to develop a native BlackBerry smartphone client that will combine SAP Customer Relationship Management (SAP CRM) applications with core BlackBerry smartphone applications. Source: “SAP and RIM Usher In a New Era for Enterprise Mobility,” RIM press release, May 2, 2008 (<http://na.blackberry.com/eng/newsroom/news/press/release.jsp?id=1543>).

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