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Hype Cycle for Wireless Devices, Software and Services, 2011

Phillip Redman

The focus on the mobile market continues to be on hardware, in the form of smartphones and tablets, as well as mobile software, particularly on mobile OSs and applications. Although most enterprises have limited mobile application support, this will increase in the coming year.

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What You Need to Know

Last year, when we looked at the new and emerging technologies on the Hype Cycle for Wireless Hardware, Software and Services, we assessed that very few new entries were made due to development and economic investment cycles, and large infrastructure purchases. However, while this year is similar, with few new entries on the Hype Cycle, there is a different assumption. In fact, it's not that large investments aren't being made in wireless technologies, but rather that many companies continue to heavily invest in current technologies and systems to keep pace with the evolution of adoption and usage. One example is in mobile device management (MDM). MDM, which was seen as a mature technology, has moved back on the Hype Cycle, even as increased investments in MDM platforms continue in order to try to keep pace with current and emerging mobile OS support that's needed and rapidly evolving. Wireless technologies and capabilities are rapidly evolving and current technologies are making much of their investments to support that.

The Hype Cycle

Using inquiry from Gartner clients as a guide, interest in mobility within enterprises keeps increasing year over year. If the past two years were all about the increased adoption of smartphones, then during the next few years, there will be greater interest in the applications used on smartphones and media tablets. To prepare for this, the top three mobile inquiries that Gartner analysts are seeing are related to mobile devices and OSs, how to manage these devices, and how to secure the content on them. This Hype Cycle is focused on wireless hardware, software and services mainly for the enterprise, and it shows increased investments in and maturity of mobile applications, their management and security support. Although we have seen little investment in new technologies, there are increased investments in existing technologies as the market demand grows. New challenges this year in securing and supporting the increasing numbers of personally owned devices, new mobile OSs in the enterprise (e.g., Android and webOS), and newer applications based on location services or taking advantage of network presence are increasingly issues for the enterprise. In addition, technologies developed for consumers are commonly finding their way into the enterprise, especially as mobility goes mainstream.

There is no doubt that mobility has entered the mainstream, particularly with the increased number of maturing technologies and the widespread adoption of wireless applications, devices and services. However, there are some major changes coming in wireless technologies that will alter the way we use technology and meld our personal and business lives as they advance services to full-Internet Protocol (IP) capability. This will allow for new business models and new pricing that will forever change the way wireless is purchased and used. Some of the new technologies on this year's Hype Cycle that are changing the way wireless technologies converge with wireline, and that will push for new business models and methods of use, include:

- Mobile quality of service (QoS) for Long Term Evolution (LTE) — Mobile QoS is seen as a key component to support high-quality voice using LTE wireless technology. There is no doubt that LTE is the hot wireless network technology in 2011 and going into 2012; however, beyond the increased data speeds is the fact that eventually all voice traffic will be run over LTE as voice over IP (VoIP). This won't happen overnight, or even in five years, but it will change the way wireless services are sold and bought.

- Cloud file sharing — Cloud synchronization allows mobile devices to automatically and transparently synchronize local information and applications with a Web-based, in-the-
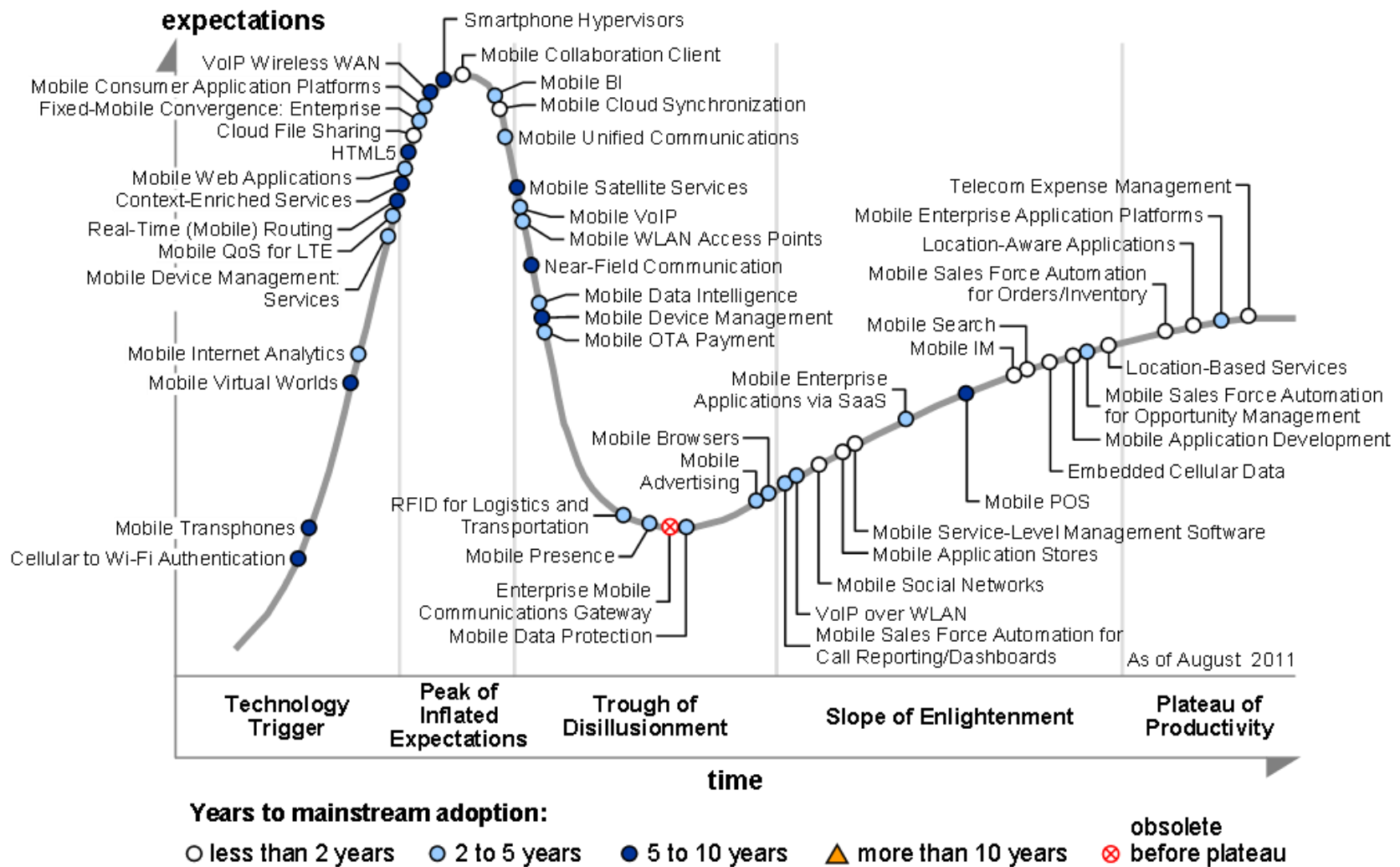
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cloud service to the user in real time. With wireless, users want to be assured of access to their data, so much of it is stored locally. However, because users have multiple mobile devices, keeping that data up to date becomes more difficult. Storing the data in a centralized depository will make data access easier and will keep it synchronized across multiple devices.

- Mobile satellite services (MSSs) — MSSs provide two-way voice and data communications to global users who are on the go or in remote locations; terminals range in size from handheld to laptop-size units. Current satellite technology offers faster speeds, lower latency, smaller terminals, longer battery life and lower costs. Mobile users will have to look to a number of mobile services and network technologies, including satellite and terrestrial services such as cellular and Wi-Fi, for the most ubiquitous communications experience.

- Mobile data intelligence (MDI) — As wireless traffic moves from voice to data, MDI helps businesses seeking to understand mobile users' usage patterns across multiple services. It is also becoming a key factor for communications service providers that can use these data to maximize their return on investment to attract new subscribers, convert existing subscribers to new products and services, and retain their overall installed base.

- HTML5 — This is the proposed specification for the next generation of HTML. HTML5 usage and stability will appear first in mobile environments, then on the desktop. It will support some offline data storage and video in a mobile environment. The battle continues between thin-client access, rich clients and native apps. HTML5, when fully implemented, weighs the solution toward a combination of thin-client access with offline data stores. HTML5 is an Internet standard that everyone wants to support for wireless capabilities.

Wireless data traffic continues to increase at many operators as the average amount of data per user increases, on average, from 250 MB per month to more than 300 MB per month in 2011. This is driven by the ever-increasing focus on smartphone applications and the use of media tablets. Just over one year later, media tablets are finding their way into many enterprises, although they are usually supported on a personal-liable basis. Messaging is widely supported in the enterprise today; however, except in specific use cases, there haven't been many specially designed mobile applications yet for the tablet. In the next year, Gartner anticipates increased development of enterprise mobile smartphone and tablet applications by the main enterprise application developers and by enterprises themselves.

The movements for most of the technologies on this Hype Cycle (see Figure 1) have been relatively slow, due to the complexity of the technology and the fact that many mobile technologies rely on other technologies to be adopted (e.g., applications on devices and services by providers). Some technologies even move back in maturity. MDM is one example of this. Although it has been out in one form or another for more than 15 years, new wireless technologies, new requirements and new OSs have made current versions less mature than in previous years. For example, the availability of new mobile OSs, such as webOS and Windows Phone 7, are not even covered by MDM platforms today, but will be adopted, even if in small numbers, by enterprises in the future, and will need to be managed. Some technologies that made bigger moves forward this year are mobile presence, VoIP over wireless LAN (WLAN) and mobile search, as the use of wireless data technologies becomes more common on a daily basis. Mobile search has matured more rapidly because of the increased capability of mobile browsers on smartphones and tablets. VoIP over WLAN is available on most enterprise-caliber unified communications platforms, even if it is used more via consumer applications, and mobile presence is built into many mobile applications that use location services.

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Figure 1. Hype Cycle for Wireless Devices, Software and Services, 2011

expectations

Smartphone Hypervisors
Mobile Collaboration Client
VoIP Wireless WAN
Mobile Consumer Application Platforms
Mobile BI
Fixed-Mobile Convergence: Enterprise
Mobile Cloud Synchronization
Cloud File Sharing
HTML5
Mobile Unified Communications
Mobile Web Applications
Context-Enriched Services
Mobile Satellite Services
Real-Time (Mobile) Routing
Mobile VoIP
Mobile QoS for LTE
Mobile WLAN Access Points
Mobile Device Management:
Services
Near-Field Communication
Mobile Data Intelligence
Mobile Device Management
Mobile OTA Payment
Mobile Internet Analytics
Mobile Virtual Worlds

Telecom Expense Management
Mobile Enterprise Application Platforms
Location-Aware Applications
Mobile Sales Force Automation
for Orders/Inventory
Mobile Search
Mobile IM
Location-Based Services
Mobile Sales Force Automation
for Opportunity Management
Mobile Application Development
Embedded Cellular Data

Mobile Enterprise
Applications via SaaS
Mobile Browsers
Mobile
Advertising
Mobile POS
RFID for Logistics and
Transportation
Mobile Service-Level Management Software
Mobile Transphones
Mobile Application Stores
Cellular to Wi-Fi Authentication
Mobile Presence
Mobile Social Networks
Enterprise Mobile
Communications Gateway
VoIP over WLAN
Mobile Data Protection
Mobile Sales Force Automation for
Call Reporting/Dashboards

As of August 2011

| Technology Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity |

time

Years to mainstream adoption:

○ less than 2 years   ○ 2 to 5 years   ● 5 to 10 years   ▲ more than 10 years   obsolete ⊗ before plateau

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The Priority Matrix

As mobile technologies become more consumer-oriented, adoption can move quickly. In the mobile market today, three years is a lifetime, so development is focused mostly on a five-year or fewer planning strategy. Some of the latest technologies that impact the Priority Matrix (see Figure 2) are connected to other fast-moving areas in IT. For example, cloud computing is finding its way to mobile support, both as a delivery model for new applications (e.g., MDM is moving from on-premises-based software to the cloud) and as an application. Cloud storage and synchronization are two enterprise mobile applications on the Priority Matrix that show the impact on cloud computing and mobility. Security, with entries such as mobile data protection and management products (e.g., MDM), is also featured this year, mostly to support the ever-increasing platforms and complex mobile devices in the enterprise. With these new devices will come an increased focus on enterprise mobile application development. In the next phase, large enterprise mobile application providers will continue to expand on their mobile platform support. A large number of tablet applications are expected during the next year. This will help drive notebook replacement at many companies as employees move from PC-based stems to more-flexible, agile, tablet-based ones. In the next phase, enterprises will begin their own application development, using technologies such as mobile enterprise application platforms (MEAPs) to support rich browsing.

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Figure 2. Priority Matrix for Wireless Devices, Software and Services, 2011

benefit	years to mainstream adoption			
	less than 2 years	2 to 5 years	5 to 10 years	more than 10 years
transformational		Fixed-Mobile Convergence: Enterprise Mobile Consumer Application Platforms Mobile Unified Communications RFID for Logistics and Transportation	Context-Enriched Services	
high	Location-Aware Applications Location-Based Services Mobile Application Development Mobile Application Stores Mobile Cloud Synchronization Mobile Collaboration Client Mobile Social Networks Telecom Expense Management	Mobile Advertising Mobile Browsers Mobile Data Intelligence Mobile Data Protection Mobile Device Management: Services Mobile Enterprise Application Platforms Mobile QoS for LTE Mobile Web Applications Mobile WLAN Access Points	Cellular to Wi-Fi Authentication HTML5 Mobile Satellite Services	
moderate	Cloud File Sharing Embedded Cellular Data Mobile Email Services Mobile IM Mobile Sales Force Automation for Orders/Inventory Mobile Search Mobile Service-Level Management Software	Mobile BI Mobile Enterprise Applications via SaaS Mobile Internet Analytics Mobile OTA Payment Mobile Presence Mobile Sales Force Automation for Call Reporting/Dashboards Mobile Sales Force Automation for Opportunity Management Mobile VoIP	Mobile Device Management Mobile POS Mobile Transphones Mobile Virtual Worlds Near-Field Communication Real-Time (Mobile) Routing Smartphone Hypervisors VoIP Wireless WAN	
		VoIP over WLAN		

As of August 2011

Source: Gartner (August 2011)

Off the Hype Cycle

There were a few technologies that moved off the Hype Cycle this year:

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- Java Platform, Mobile Edition — In 2010, interest began to wane, with more attention placed on cross-platform tools for rich Internet applications (RIAs) and Web browsers. Interest and adoption is practically nonexistent today.

- Unlicensed mobile access (UMA) — A limited number of devices and handsets still have UMA support (predominantly from Nokia, Research In Motion [the BlackBerry] and Samsung). Due to the minimal uptake in the market and many viable alternatives, we've moved this technology off the Hype Cycle.

- Mobile email services — Mobile email is becoming a commodity and will experience mass-market adoption, because most phones support it (via a client or a browser approach). Wireless email consumer services are often not appropriate for enterprises, because of their limited capabilities, security factors and lack of international support.

On the Rise

Cellular to Wi-Fi Authentication

Analysis By: Tim Zimmerman; Michael J. King

Definition: Cellular to Wi-Fi authentication provides a foundational component for dual-mode smartphones to move freely between cellular and Wi-Fi connectivity for voice and data applications. This multivendor and multiple physical layer authentication allows cellular connections to be transferred to Wi-Fi, as well as among multiple Wi-Fi vendors from one installation to another, whether it is a hot spot or, ultimately, within an enterprise. Mobile users, whose devices can move between 3G and Wi-Fi networks at a low level using a 802.21 handoff, also need a unified and reliable way to authorize their access to all of those networks. 802.11u provides a common abstraction that all networks, regardless of protocol, can use to provide a common authentication experience.

Position and Adoption Speed Justification: The ratification of 802.11u, which provides the necessary functionality for internetwork communication such as network discovery and selection, has boosted the momentum for initiatives such as the Wi-Fi Alliance's Next-Generation Hotspot or Hotspot 2.0. Initial vendor testing is just beginning with the Wireless Broadband Alliance and will begin in the fall of 2011 for the Wi-Fi Alliance. Vendor trials will show the ability to authenticate, but vendors will still need to negotiate roaming agreements and to facilitate rolling out the necessary hardware and software for the end-to-end solution for all components of the multivendor solution.

User Advice: Users should expect that once the functionality has been agreed upon by the industry it will take time for the necessary hardware and software to be implemented. They should also expect issues with initial implementations of multiple vendor solutions in hot spots, as well as within the network infrastructure. Enterprises looking to use the technology to additionally provide a migration strategy for roaming among Wi-Fi vendors will have more initial success, since they control the end-to-end solution.

Business Impact: The ability to seamlessly roam from cellular to Wi-Fi will be huge as Wi-Fi continues to provide a 450 Mbps connectivity through a single access point architecturally capable of over 1 gigabyte of Wi-Fi connectivity through layering and load balancing using multiple access points. The offloading ability will provide a solution for density-rich environments, such as stadiums, metropolitan areas or university classrooms.

Benefit Rating: High

Market Penetration: Less than 1% of target audience

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Maturity: Embryonic

Sample Vendors: Aruba Networks; AT&T; Cisco; Verizon

Mobile Transphones

Analysis By: Monica Basso

Definition: Mobile transphones are mobile device products with an innovative and/or adaptive form factor that users can modify dynamically, based on their specific contexts and needs. Some products are still at the conceptual model stage (such as Nokia Morph), while others are already commercially available. Nokia Morph is based on the notion that, at some point, there will be innovative materials (possibly based on nanotechnologies) to enable a flexible, foldable, stretchable design, thus enabling users to transform their mobile devices into radically different shapes. Modu's Modu Mobile uses a modular, Lego-like approach, based on building blocks, to assemble and create the most appropriate form factor for a user at a given time.

Position and Adoption Speed Justification: Despite the hundreds of mobile devices and models available on the market, personalization is limited. Personalization is mostly about aesthetics and cosmetics — covers in fancy colors and materials, themes with images and ring tones, and accessories such as hanging items and holders. Normally, it does not concern functionality and the form factor, which are rigidly assigned to a device, depending on the target market segment. Mobile devices come with a range of capabilities and functions, but their form factors tend to be optimized on a primary function — for example, email capabilities, as in BlackBerry 88xx devices; camera and multimedia capabilities, as in Nokia N95; and Internet browsing, as in the iPhone.

Most smartphones accumulate a range of capabilities (the "Swiss Army knife" concept), without form factor optimization for most of them. As a result, people tend to adopt a combination of devices to meet their needs. Personalization can be more than that. People will be able to get what they need at a certain point in time, depending on the context, and their roles and needs. Mobile devices will increasingly gain a context-adaptive form factor that provides more personalization and optimization of use.

This evolutionary process for mobile devices will develop through stages. Today's stage is (as in Modu Mobile) based on pluggable, wired, inflexible components. The next stage is likely to be based on wireless, inflexible components, as well as wireless interconnections, such as Bluetooth and, especially, Bluetooth LE (beginning around 2011). This will enable new types of peripherals, such as intelligent jewelry, that can talk to the mobile phone. Flexible is likely to start with simple flexible components talking to an inflexible handset core (for example, a flexible wrist screen talking wirelessly to more-conventional inflexible handset electronics). Before 2015, some handsets will offer separate components, such as a secondary screen and keypad. Wireless video will become a common feature, driven by the Wi-Fi Alliance's standardization efforts.

Due to the preliminary stage of the market, Modu went bankrupt in early 2011; however, its patents have been bought by Google. Interesting adaptations of the transphone model have been launched in 2011 by notebook and smartphone vendors — for example, Asus Padphone, a tablet that embeds a smartphone, and Atrix, a notebook that embeds a smartphone.

User Advice: Organizations should monitor future innovations that will drive more personalization of mobile devices. This will enable them to better meet the needs and expectations of different user groups (per demographics and gender) in their employee and client bases. Handset manufacturers not yet active in this area should investigate people's expectations and plan to deploy one or two transphone products to judge user acceptance.

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Business Impact: Mobile transformer products will not significantly affect businesses until similar products become available, and they become a priority for anyone involved in the mobile device ecosystem, such as mobile operators, service providers and application developers. We do not expect this market shift to happen before 2015.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Asus; Google; LG; Nokia

Recommended Reading: "Social Trends Are Influencing the Adoption of Mobile and Web Technology"

"Emerging Technology Analysis: Mobile Transphones, Mobile Device Technologies, 2009"

"Device Portability Is Subjective and Contextual"

"Future Technology: The Plastic, Flexible Gigabit Phone"

Mobile Virtual Worlds

Analysis By: Monica Basso

Definition: A mobile virtual world is a simulated environment that enables subscribers to inhabit and interact via avatars running on mobile phones. Mobile virtual worlds are either mobile extensions of traditional PC-based virtual worlds such as Second Life, or pure-play mobile environments. Users can create their avatars on the Web, which will then live in their mobile phones (for example, a Tamagotchi, an electronic pet or friend with a life and a personality). Virtual worlds may be displayed as pure 3D worlds (isometric views) or live video as part of that 3D world.

Position and Adoption Speed Justification: Around 2008, a number of mobile virtual worlds appeared on the market as mobile clients to access either Web-based virtual worlds or pure-play mobile environments. These mobile extensions are meant to enable access to conventional virtual worlds on the move for virtual community members as a sort of "keyhole" to those worlds. The obvious limitations of mobile devices, in terms of screen size, hardware resources and bandwidth (as opposed to the huge demand for resources from PC virtual worlds), made it difficult to build an acceptable experience on such small-form-factor devices, so adoption was limited and slow. Experiences such as Mini Friday (a mobile virtual world running on the Nokia S60 handset, with approximately 1.7 million users, developed by the Finnish company Sulake) ended in 2010.

Since then, the technology and business cases for virtual worlds have progressively merged with augmented reality, games and social networks, and mobile virtual worlds have changed. For example, now Sulake runs a service called Bobba, a virtual bar for flirting and hanging out, available also on iPhones, iPads and Nokia smartphones in native mobile applications downloadable through the application store. Mobile Grid is a Second Life messaging client for Android devices. Pocket Metaverse offers a mobile client for Second Life providing access to major functions.

In the area of mobile gaming, MoiPal (by the Finnish company Ironstar Helsinki) is targeted mostly at teenagers, and is a cross-platform mobile game with an online environment for customizing the players' virtual content. Users can create their avatars (pals) on the Web, then transfer them to a phone. The avatar lives in the mobile phone as a friend, or a Tamagotchi, and

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can travel to a virtual city and report back to the user about its adventures upon returning. Users can purchase game extensions and content using Short Message Service, PayPal or a credit card. Indirect revenue comes from advertising, sponsorship and more. MoiPal is also a Facebook application. A number of other mobile games put the participant directly in the action and merge a self-representation, context-aware properties and 3D graphics, e.g., Viewdle, the new Transformers game, and the paranormal game from Ogmento. Also, there are some virtual worlds functionality built into augmented reality apps, such as Junaio, Layar, Wikitude and TagWhat. i-Citizen 3D from the U.K.-based company Micazook enables users to create avatars on the Web that can wander around different geographical locations, such as London, Barcelona and New York.

With the arrival of the iPad and other media tablets, the potential to run bigger virtual environments becomes more realistic. With the extreme popularity of Facebook and browser-based gaming (e.g., FarmVille), keeping track of endeavors via a mobile device becomes a high probability that would create even greater stickiness and the need to return to the virtual world more frequently. The screen limitations that have constrained mobile gaming and virtual environments may ease, at least in some sections of the market.

Finally, mobile virtual assistants are emerging to help in the area of customer service. For example, Indisys offers a mobile assistant that can interact with users through natural-language dialogues and in written or spoken chats with speech synthesis. Conceptual prototypes based on this technology include a sports and diet assistant on smartphones that can suggest healthy and balanced diets and daily exercises based on health conditions and personal objectives.

Mobile device capabilities have significant 3D graphics capabilities (e.g., Nvidia CPU's now included in many Android phones/tablets), OpenGL ES and engines like Flash 3D and Unity and other mobile 3D developer services will drive the different types of mobile virtual worlds that are being created. These technology areas will continue to merge and impact use cases.

User Advice: Evaluate the emergence of mobile virtual worlds as an opportunity to pursue innovative mobile marketing and advertising strategies in the business-to-consumer context. These technologies are still at an embryonic stage, but will see further development and adoption. They have the potential to significantly change user interface paradigms on mobile applications for consumers and enterprise users.

Business Impact: Mobile virtual worlds are aimed at young users (tweens or teens), mostly to support gaming or social networking on mobile devices. However, these new mobile application paradigms might innovate traditional mobile application interfaces and significantly transform the interaction style and application designs during the next three years. Areas that might see benefits from adoption include marketing, advertising and customer service. Security concerns also may arise, for example, from location-based solicitations, which will become a new form of phishing in mobile worlds.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Creative Virtual; Indisys; Ironstar Helsinki; Micazook; Sulake

Recommended Reading: "Emerging Technology Analysis: Mobile Virtual Worlds"

Mobile Internet Analytics

Analysis By: Bill Gassman

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Definition: Mobile Internet analytics are applications which provide information to business users and operations on the mobile device usage of an enterprise's Internet content, or mobile device resident applications. This information is used to improve the user experience and business results through the mobile channel. While the techniques used are similar to those in Web analytics, there are differences in measurement techniques and the scope of what is measured.

For browser use on mobile devices, well known information such as page views, browser type, screen size and so forth is usually captured. The quality of information from some mobile browsers is reduced, because not all support common instrumentation techniques such as cookies and JavaScript. Server-side data capture is often used as a work-around for these limitations. Native mobile applications can be measured when instrumentation code is deployed as part of an application. Some instrumentation toolkits support saving offline application usage and uploading it when the device is online again. Analytic applications may take advantage of sensors found on mobile devices such as location, orientation and acceleration.

Position and Adoption Speed Justification: This is the first time that mobile Internet analytics appears on the Hype Cycle and it enters at the mid-point between the Technology Trigger and the Peak of Inflated Expectations. There have been attempts at mobile Internet analytics during the past five years, but the sophistication of mobile devices has presented too many challenges to warrant much effort. All the major Web analytics offerings support mobile devices and offer toolkits for mobile application development; however, there are also vendors focused exclusively on the mobile space. In addition, advertising networks measure mobile behavior, to better target users with mobile ads; also, mobile surveillance systems run within the mobile carriers to help them to understand their customers better.

The justification of two to five years to the Plateau of Productivity is based on the many pure-play vendors providing innovation, and a rapid increase in mobile device use. The leading Web analytics firms will acquire the mobile technology needed. However, violations of privacy will continue to be an issue and may inhibit what is ethical to analyze, especially with the new types of information that native applications can gather.

User Advice:

- A mobile Internet analytics strategy should be based on the nature of the activity in the mobile arena:

- If mobile is an extension of the Web channel, use a leading Web analytics product so that mobile usage can be easily contrasted with that of traditional users.

- If building new business on mobile applications, look at Web analytics firms for toolkits, but also evaluate the analytics provided by the pure-plays or mobile application development vendors. They will be the first to exploit the additional functionality that mobile applications can provide.

- When the mobile audience is composed of devices which poorly support instrumentation, understand the limitations and effort required to produce quality data — before heavy investment.

- In many markets, mobile technology will quickly catch up with what is currently leading edge. Review your user privacy policy, to ensure that it addresses the new concerns that mobile users have, especially when tying identity to location.

Business Impact: Where mobile users are an extension of the Web channel, the value of mobile analytics will mirror the value achieved with traditional Web analytics. The benefits come from improving the customer experience by segmenting the mobile users, subsetting by phones and

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tablets, understanding the patterns of behavior and adapting the Web channel to meet mobile user needs. Where mobile applications are being built, analytics are the eyes into what is being done with those applications — so that improvements can be made.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: AdMob; Adobe; Bango; Google; Neuralitic; Webtrends

Recommended Reading: "Use Web Analytics When Defining a Mobile Internet Strategy"

Mobile Device Management: Services

Analysis By: Phillip Redman; Eric Goodness

Definition: Mobile device management (MDM) services involve sourcing, provisioning, securing and managing handheld mobile devices (primarily smartphones and media tablets) to a third party. This may include PC cards, pagers, notebooks and other mobile devices. MDM services may also include support for any or all of these main areas: hardware (inventory, provisioning and asset), software (configuration management, software distribution and updates), security (black list, encryption, antivirus, authentication, jailbreak/rooted notification) and network service management. Though PC life cycle and MDM vendors have looked to sell software in the enterprise to support mobility, MDM services are evolving to support the increasing number and complexity of mobile devices where enterprises don't have the resources or knowledge to do it on their own. Today, mobile devices are managed in a variety of ways — for example, via their application platforms (mobile enterprise application platforms [MEAPs]; messaging servers like Research In Motion's [RIM's] BlackBerry Enterprise Server [BES] or Exchange ActiveSync [EAS]). But mobile devices have limitations, as companies look for deeper control that EAS may not offer, scale to a larger number of devices or platforms to support, or a unified platform capability to support multiple mobile platforms. These approaches may be used in addition to telecom expense management services (TEM), which focuses on the network service management aspects of MDM.

Position and Adoption Speed Justification: MDM software is one of the hottest inquiries about mobility that Gartner receives, as companies are looking to scale their support for mobile devices. Each new platform or device that emerges is a new challenge and holds back the maturity of MDM software. Many MDM service providers don't have their own tools, but use those tools in partnership provided by the MDM software players.

MDM services are still developing from five main areas:

- MDM vendors that are launching MDM service support

- New MDM service providers

- Communication service providers that are just starting to launch noncore IT services

- Telecom expense management vendors that are expanding from service to device management

- IT outsourcers that are beginning to offer MDM in their service offerings to the enterprise

User Advice: Assess your internal knowledge and resources for managing the ever-increasing flood of sophisticated smartphone devices. Evaluate the emerging MDM services to see how they

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fit in with your strategic adoption and support of mobile devices. This should also align with your adoption of outsourcing in other IT areas.

Business Impact: The cost for managing mobile devices continues to grow as lack of standardization, but increased security and management needs, continue. There was widespread adoption of non-BlackBerry devices during the past year, a trend that is continuing with iPhone and Android devices capturing additional market share. Enterprises also need to manage the increasing use of media tablets. MDM services can also help manage the trend of supporting non-company-owned devices and to scale the use of these devices on a global basis.

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Enterprise Mobile; Verizon Business; Vodafone Global Enterprise; Vox Mobile

Mobile QoS for LTE

Analysis By: Joy Yang

Definition: Mobile quality of service (QoS) is often talked about in marketing pitches, but rarely defined. For years, some level of quality has been ensured in mobile calls through means such as better termination and echo cancellation. "Quality of experience," (QOE) an alternative, widely used term, refers to a similar concept.

Voice calls over third-generation (3G) cellular networks remain circuit-switched, so have less need for QoS than voice over Internet Protocol (VoIP) networks. However, the need for QOE will increase when mobile operators move to Long Term Evolution (LTE) technology. As mobile operators' business models evolve to accommodate data services becoming more important for revenue than voice services, and the network being upgraded to LTE and becoming fully based on IP, mobile QoS will extend to characteristics traditionally associated with fixed-line Internet services. It will become end-to-end QoS.

According to the Third Generation Partnership Project (3GPP), the voice solution for LTE is IP Multimedia Subsystem (IMS) VoIP, which is fully specified as a future Evolved Packet System (EPS) solution. QoS has progressed from user equipment initiation only in the 3GPP's Release 5 standard to include policy-based networking-element initiation in Release 8. The policy-based networking element is called the Policy and Charging Rules Function (PCRF), which is interconnected with the Evolved Packet Core (EPC) and IMS control network. QoS is based on the control of the QoS Class Identifier (QCI) and the Allocation and Retention Priority (ARP). The QCI will be used to reserve resources at the gateway and in the radio access network. High-QCI applications include real-time gaming and voice over IMS (VoIMS).

Because the established concept of QoS for Global System for Mobile Communications (GSM) and wideband code division multiple access (WCDMA) networks is somewhat complex, LTE System Architecture Evolution (SAE) aims for a concept of QoS that combines simplicity and flexible access with backward compatibility. LTE-SAE adopts a class-based concept of QoS that gives operators a simple, yet effective, way to differentiate between packet services. Evolved Universal Terrestrial Radio Access Network (E-UTRAN), an all-IP architecture, will support end-to-end QoS.

Position and Adoption Speed Justification: Mobile QoS is seen as a key component of LTE, but might not be fully exploited at first. It is unclear how widely mobile QoS will be used, even in all-IP mobile networks based on LTE. According to the QCI's definition, real-time gaming, VoIP

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and VoIMS are the most QoS-sensitive applications, for both wireline and wireless networks. Current LTE deployments focus on data-only mobile applications.

For LTE operators, mobile QoS can be used as a differentiator in their service offerings. Communications service providers (CSPs) can adopt chargeable QoS for prioritized subscribers or applications.

QoS has been available for years on the fixed-line Internet, but is little used — ISPs and users are accustomed to a "best effort" level of service. It is possible that mobile QoS, together with a widely adopted voice over LTE technology, will also take years to mature, though probably only two to five.

User Advice: Implementing and enforcing mobile QoS for LTE would yield great improvements, but other factors would continue to affect the overall user experience. There could still be substantial variations in the performance of operators' LTE networks, as performance depends on a wide range of issues, including network backhaul capacity, cell configuration and the processing capacity of receiving devices. Also, as with any cellular technology, LTE performance will worsen as users move away from the center of a cell, but less so than with WCDMA.

Enterprises should appraise their chosen LTE operator for the above factors. They should not think that implementing QoS is sufficient by itself.

Carriers that implement mobile QoS should realign their network management and service assurance solutions to have maximum impact on their operations. When submitting requests for information and requests for quotations for mobile QoS, carriers should follow a clear service assurance strategy, taking into account performance management, test and measurement solutions, and fault and event management solutions. It might be a good idea to work with a single strategic partner that can provide the perspective of a long-term evolutionary path for service assurance.

Business Impact: End-to-end QoS is vital for video, and VoIP quality. End-to-end QoS control will ensure that LTE can provide telco-quality video services and VoIP.

The voice call continuity service in the IMS core will ensure that VoIP services are interoperable with circuit-switched voice and VoIP services on existing Universal Mobile Telecommunications System networks. Initially, voice over LTE via Generic Access (VoLGA) was considered for voice support, but it has been superseded by voice over LTE, which uses IMS.

Benefit Rating: High

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Alcatel-Lucent; Bridgewater Systems; Cisco; Ericsson; Huawei; Motorola; NEC; Nokia Siemens Networks; Tekelec; ZTE

Recommended Reading: "The Impact of LTE on Corporate Wireless Strategy"

"Dataquest Insight: Mobile Operators Must Manage Costs While Nurturing LTE Revenue"

"Early Commercial LTE Networks To Reach Sweden, Norway"

"Vendor Rating: Ericsson"

"Market Share: Mobile Carrier Network Infrastructure, Worldwide, 2008"

"Forecast: Carrier Network Infrastructure, Worldwide, 2005-2014, 1Q10 Update"

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"Dataquest Insight: Femtocell Market is Unlikely to Take Off Before 2012"

"Emerging Technology Analysis: Long-Term Evolution (LTE), Hype Cycle for Wireless Networking Infrastructure, 2008"

Real-Time (Mobile) Routing

Analysis By: C. Dwight Klappich

Definition: Newer real-time routing solutions are emerging that will enable real-time communication between the routing application and drivers to track their activities and locations, and, when necessary, to reroute them "on the fly." Initial solutions will be dispatcher-centric, with limited communication with the driver, but more robust solutions will emerge that can automatically and proactively adapt to daily activities. For example, as traffic monitoring solutions emerge and become pervasive, the routing system could receive notification of a traffic congestion problem that would delay a driver, and for which rerouting might be warranted. Then the system could dynamically recalculate the route and communicate the new route to the driver in real time.

Traditional routing and scheduling applications typically used batch planning algorithms wherein orders for a day's worth of deliveries were planned together, creating an optimal set of routes for a given day or shift. These routes were assigned to a driver and an asset, and the routes were often distributed on a piece of paper (although, more recently, many users have been using mobile devices or electronic onboard recording devices). As technology has evolved and mobility technologies have become more cost-effective, there has been a shift from paper distribution of routes to electronic downloads to handheld or other devices, but the routes are still static and set at the beginning of the day or shift.

Grouping orders and running them through a batch solver allows for consideration of the most alternatives and will provide a better, more optimized solution. However, as businesses become more dynamic, companies will need to balance the trade-offs between optimal and feasible routes that consider changes throughout the day. The best alternative will be the one that combines the approaches wherein the largest group of orders/deliveries is considered in the initial solve, but then more dynamic algorithms are used to adapt the schedules during the day as changes occur.

Position and Adoption Speed Justification: Real-time routing solutions are nascent, and only a few vendors are testing the reach of these types of solutions so far. Initial solutions will be adaptations of traditional routing and scheduling, wherein a route could be replanned and a dispatcher would control the process. In the future, more automated solutions will emerge, with real-time data (such as traffic data) from within and outside the organization being used to more automatically direct daily activities. Similarly, support for pieces of this technology is becoming more mature and commonplace, such as automated vehicle locating, but the numerous technologies required to accomplish real-time routing have not yet been integrated to the extent that real-time rerouting in transit can become automatic and systemic, not people-driven.

User Advice: Users should first get daily routing and scheduling under control — the first priority is to implement more traditional routing and scheduling solutions. Mature users of commercial routing and scheduling who are seeking incremental benefits should determine what, if anything, their current vendors are doing or plan to do with regard to real-time routing. However, most users should conduct new investigations, considering their incumbent vendors as well as others.

Business Impact: Real-time routing will add incremental benefits to mature users of routing and scheduling, further reducing costs and improving service in dynamic environments. Less mature users should start with traditional routing and scheduling tools that are mature and proven.

Benefit Rating: Moderate

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Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Descartes Systems Group; Manhattan Associates; Ortec; Quintiq; RedPrairie

Recommended Reading: "Supply Chain Management Vendor Guide, 2008"

"Roundup of Supply Chain Execution Research, 2008"

At the Peak

Context-Enriched Services

Analysis By: William Clark; Anne Lapkin

Definition: Context-enriched services use information about a person or an object to proactively anticipate the user's need and serve up the content, product or service most appropriate to the user. The IT industry is beginning to recognize a pattern where augmented reality offerings, mobile location-aware ads, mobile search and social mobile sites fall under the umbrella term "context-aware." Context-enriched services are the fundamental unit of software for improving user experiences through context, and are an implementation foundation for context-aware computing. These terms denote services and APIs that use information about the user to optionally and implicitly fine-tune the software action with better situational awareness. Such services can proactively push content to the user at the moment of need, or suggest products and services that are most attractive to the user at a specific point in time.

Context is relative and describes the environment, history or setting in which a user interaction occurs. From a software perspective, the context for a service is information (data) that can add value to the functioning of the service, but is not essential to it. In the absence of context information, the service is still operational, but may not provide results that are as finely targeted. The currency and quality of the context information will determine the value it adds to the service. Most applications that benefit from context-enriched services will subscribe to them using service-oriented-architecture (SOA) techniques and implementations.

Context-enriched services will also require sophisticated reasoning to determine how software actions should be changed to make them more appropriate for the user's context.

The more current and selective the context information, the more precise the functioning of the service. Context-enriched services are provided by context brokers, which are designed to retrieve, process and stage this information so that subscribing functions can use relevant context in addition to processing incoming data. When an application uses context-enriched services, it is a context-aware application. As a best practice, context-enriched software services have the modularity and accessibility of SOA and use SOA-related standards.

Position and Adoption Speed Justification: Context enrichment refines the output of services and improves their relevance. We observe implementations today in mobile computing, social computing, identity controls, search and e-commerce — the areas in which context is emerging as an element of competitive differentiation. However, the current context-aware solutions are fragmented — they are individually designed, custom-developed and deployed, and because of their competitive importance are often not widely distributed or advertised. The movement in social computing to open and shared social relationship (social graph) information is an early step toward the standardization of context-aware computing APIs; however, most of the required standardization effort has not yet begun. Context-enriched services will require multiple stages of innovation and platform technology evolution before their essential benefit is well-understood in the broad mainstream computing markets.

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In 2011, we are seeing specific services aimed at consumers beginning to take shape in the form of services offered by context providers such as Apple that allow advertisers to plug content into certain situations, whereas before all these services were custom-built. Context-enriched services have advanced significantly during the past year, moving from a midpoint post-trigger position toward the Peak of Inflated Expectations. We are seeing an increasing number of applications that, while they may not use the term "context-aware computing," are clearly using context information to improve the user experience. These include Apple's recent developer guidance regarding location-aware advertising, the augmented reality systems that give information on an object shown in the camera lens of a phone, and the ability of Google Android-based phones to augment services based on the user's contacts and behavior, and other components of context information.

In the long term, there will be a shift from reactive to proactive services, so push and subscribe will be more prevalent, and the number and richness of information sources will rise.

User Advice: Context-enriched services will begin with simple scenarios (one category, such as location) and will evolve into compound patterns (e.g., taking into account location, presence and group behavior). Application developers and service providers should take advantage of the wide range of contextual opportunities in their e-commerce, security, social computing and mobile computing systems. Some early context processing can be achieved using event processing and complex-event-processing technologies; enterprises need to plan to incrementally develop or source more context-enriched services in step with their ambition levels of improving the user experience.

Business Impact: Context-enriched services will be transformational for solution providers. Context enrichment is the next frontier for business applications, platforms and development tools. The ability to automate the processing of context information will serve users by increasing the agility, relevance and precision of IT services. New vendors that are likely to emerge will specialize in gathering and injecting contextual information into business applications. New protocols like Real-Time Bidding (RTB) will allow for the mashing up of and delivery of context-enriched services. Most context-aware applications are likely to arrive as incremental enhancements to SOA, without a major disruption to the prior architecture. However, the new kinds of business applications, especially those driven by consumer opportunities, will emerge, as the function of full context awareness may end up being revolutionary and disruptive to established practices.

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Appear Networks; Apple; Google; Microsoft; Nokia; Pontis; Sense Networks

Recommended Reading: "Context-Aware Computing: The Future Is Now"

"Key Issues for Context-Aware Computing, 2010"

"Context-Enriched Services: From Reactive Location to Rich Anticipation"

"Context-Aware Computing: It's Time to Carefully Choose Your Vendors"

"Apple Note Signals Move to Claim Context-Aware Advertising"

Mobile Web Applications

Analysis By: David Mitchell Smith; William Clark

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Definition: Mobile Web applications refer to applications for mobile devices that require only a Web browser to be installed on the device. They typically use HTML and Ajax (and, increasingly, HTML5 components), although they may make use of augmented rich Internet application (RIA) technologies, such as Flash, JavaFX and Silverlight, but are not written specifically for the device. Rich, mobile Web applications have roughly equivalent usability to PC-rich Web applications (or RIAs), when designed specifically for smaller form factors. Simple mobile Web applications limit the use of RIA technologies and are designed to present information in a readable, action-oriented format. Mobile Web applications differ from mobile native applications, in that they use Web technologies and are not limited to the underlying platform for deployment.

Position and Adoption Speed Justification: For many years, users have hoped that mobile Web applications would go mainstream. Although acceptance has been higher in some geographies than in others, the experience was less than ideal, until the introduction of the Apple iPhone. Its Safari browser, along with good JavaScript support and overall ease of use, has made the difference. When the iPhone was introduced, the only way to develop for it was via Web programming. Although, subsequently, Apple has moved emphasis toward native applications (via the Apple App Store), its contribution greatly raised the bar for mobile Web applications. In addition, Apple and other vendors (for example, PhoneGap, WebApp.Net, CiUI and MotherApp) have libraries that allow for a richer-than-expected user experience, using primarily HTML and Web technologies. Often, these are used in conjunction with extensions or native code wrappers for JavaScript that enable mobile Safari applications to access the accelerometer, geolocation, multitouch, and, in the future, camera, sound and vibration functions.

Google's Gmail is a Web application without a wrapper. It uses Safari's HTML5 functions and SQLite offline storage to provide a user experience comparable to the native iPhone Mail application, without any installation or upgrade. Improvements in other platforms and browsers (e.g., Google's Android and Palm's webOS) continue this push. Research In Motion (RIM) has acquired a WebKit-based browser and is in the process of integrating it into its BlackBerry smartphones. The real movement will happen as critical mass for various pieces of HTML5 materializes; however, testing and interoperability issues will remain due to implementation differences. For example, the HTML5 spec leaves some caching implementation details to the browser supplier; thus, there will be differences in how offline modes operate. The proliferation of WebKit-based browsers in mobile will help with this. HTML5 is early in the Hype Cycle, but components of the specification are beginning to see adoption. The hype has not yet peaked (see "HTML5 and the Modern Web" for more details).

User Advice: The mobile Web experience is driven by consumer applications first. It is a result of the direct impact of consumerization on enterprises. Organizations wishing to address mass-scale opportunities through mobile Web adaptation platforms need to consider Netbiscuits, InfoGin, Volantis Systems and Usablenet. The iPhone points the way toward a new consciousness of richer user interfaces and services on mobile clients.

Portability among applications in the mobile world remains a challenge. This is largely due to current and future fragmentation in the mobile market. Gartner recommends Web standard approaches when portability and ease of development are goals. Other issues, such as form factor (small screens are not optimal) and connectivity (intermittent and costly in many cases), also need to be factored into decisions.

HTML5 and Web technologies make the most sense when reach across multiple platforms is a strong requirement. Native approaches make more sense when there is a need to take advantage of the leading-edge device capabilities. Hybrid approaches are increasingly becoming a viable way forward as well.

Business Impact: As a result of the success of the iPhone, mobile presence has become a critical requirement for reaching consumers and, increasingly, business users. The mobile Web,

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as first delivered in a satisfactory way by the iPhone, has made mobile Web clients feasible. Although many organizations may have started down a mobile Web path with early-generation technologies, such as Wireless Application Protocol, the advent of native applications for the iPhone and other smartphones has recently been the focus. Online strategies must increasingly take into account a native mobile application experience, as well as the need to reach more platforms. A mobile Web experience is a good way to do this.

Two major reasons for going with mobile Web applications are to hedge your bets regarding platforms and to support multiple platforms. Another consideration is security, because direct access to device software introduces additional security concerns. Java has not delivered its promise of cross-platform deployment (Java Platform, Micro Edition does provide some standardization) in the mobile sector. Flash and Silverlight are choices for only a subset of devices, not the iPhone. Mobile Web applications can — in certain scenarios and with careful attention to APIs and extensions — provide a rich user experience that does not equal native applications, but approximates it at a fraction of the development effort and with greater portability and flexibility.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Apple; Google; Microsoft; Netbiscuits; Nokia; Research In Motion; Sencha; Usablenet

Recommended Reading: "Magic Quadrant for Mobile Consumer Application Platforms"

"HTML5 and the Modern Web"

HTML5

Analysis By: David Mitchell Smith; Gene Phifer

Definition: HTML5, as the heir apparent to HTML4, is a logical next step in the development of HTML. However, the term HTML5 is often used to mean much more than the formal specification, and much less simultaneously (see "HTML5 and the Modern Web"). HTML5 is the proposed specification for the next generation of HTML. Although the process of creating the specification began in 2004, it was only in the first part of 2010 that HTML5 moved to the foreground of industry conversation and enterprise technology managers' agendas. HTML5 is important, as it brings to the Web much of the rich Internet application (RIA)-like capabilities that have required additional software.

HTML5 is not one thing. At one extreme, the hype and aura around the term can lead to using it to mean one particular feature (e.g., video). At the other extreme, treating it as if it is one very large inseparable thing will lead to a "wait until it's done" approach, which will prove to be a bad choice for most companies. HTML5 consists of many components, including video, canvas, audio and offline capabilities. In addition, other modern Web capabilities, such as JavaScript, CSS3 and WebSocket, are closely related and often grouped together.

Position and Adoption Speed Justification: HTML5 has been in the headlines recently and has garnered extremely charged opinions as a result. The extreme opinions abound, ranging from "HTML5 will make everything else (especially Flash) irrelevant" (see "HTML5 and the Future of Adobe Flash") to "It will take over a decade for HTML5 to be ratified, so we don't need to pay attention to it until then." The reality is, as usual, somewhere in between, and is time- and scenario-dependent.

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The working subset and de facto standards may be driven by mobile devices. OS fragmentation continues to be a significant issue in mobile. However, the vast majority of mobile browsers for smartphones are, or will be, based on WebKit. OS fragmentation increases the need for a viable cross-platform strategy. The common technology base of WebKit and the evolution of working subsets and the de facto nature of HTML5 pieces may fit this need.

HTML5 usage and stability will appear first in mobile environments, then on the desktop. HTML5 usage and stability will be driven by desktop and mobile use scenarios, and there will be different drivers for both environments.

User Advice: Developers should:

- Familiarize themselves with the components of HTML5, and which ones will be supported in which browsers.

- Exploit available features of HTML5 now, but recognize that they are based on a draft standard and are subject to change.

- Consider HTML5 when designing applications that require the broadest reach across the most browsers and devices.

Business Impact: There is visible momentum around HTML5; however, as with most technologies, especially on the Web, interest is occurring primarily outside the enterprise sector — among progressive Web designers and among mobile application developers. Web developers are starting to design around new elements in HTML5, such as canvas, offline mode and video. Some websites are also starting to abandon support for older browsers, such as Internet Explorer 6 (IE6). Although those browsers still have significant enterprise share, they don't support HTML5. Developers of RIA-based sites that rely on Flash and Silverlight are evaluating HTML5 as a possible alternative, over the long term, to continued reliance on Flash and Silverlight. Mobile developers are interested in HTML5 as a cross-platform technology that avoids reliance on "native" applications; this is especially significant due to recent changes to Apple's developer terms of service (TOS), limiting the use of third-party programming tools for iPhone applications.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Adobe; Apple; Google; Microsoft; Research In Motion

Recommended Reading: "HTML5 and the Modern Web"

"HTML5 and the future of Adobe Flash"

Cloud File Sharing

Analysis By: Monica Basso

Definition: Cloud file sharing refers to a range of cloud services that allows people to store and synchronize documents, photos, videos and other files in the cloud — and share them with other people. These services also allow users to share and synchronize data among multiple devices for a single owner. These services are accessible through desktops, notebooks, smartphones and media tablets, and provide a simple mechanism for synchronizing data across multiple devices.

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Position and Adoption Speed Justification: The rapid adoption on these tools is driven by the success of the iPad and other consumer devices, which, while offering enhanced experience to users, lack basic capabilities, such as a file system. Another driver for these services is the trend toward multiple device ownership where any individual has two or three devices, hence a synchronization problem. Some tools, such as those from Dropbox, are extremely simple to use and the basic service is free, while enhanced paid services offer higher-capacity storage and multiuser licenses. This makes them very attractive to individuals and drives adoption. Apple announced that iCloud services will likely be available in 2H11, and will provide data-sharing mechanisms among multiple Apple devices. However, security risks may slow down adoption in the enterprise. Such services may be particularly problematic in regulated industries where the cloud provider isn't trusted by the regulator and may be located in another country or under different legislation.

User Advice: Organizations that have introduced employee-owned device programs should be aware of the easy availability and growing adoption of these tools. They should explore potential security risks (giving particular consideration to data encryption and access permissions) and evaluate how to exploit these capabilities to enhance mobile collaboration and user productivity. They should consider services that are enterprise-oriented, such as those from Box.net and GroupLogic. Organizations that depend on email systems for the majority of internal file transfers should re-evaluate message file size limits to ensure they manage the demand for external file transfer capabilities.

Business Impact: Cloud file sharing will enable higher productivity and collaboration for mobile workers who deal with multiple devices.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Apple; Box.net; Dropbox; Group Logic; TeamDrive

Recommended Reading: "Cool Vendors in Enterprise Mobility, 2011"

"Secure Low-Cost Data Sharing and Collaboration With iPad"

Fixed-Mobile Convergence: Enterprise

Analysis By: Phillip Redman

Definition: Fixed-mobile convergence (FMC) is the intersection of fixed and mobile technologies and services under unified communications (UC). It is primarily defined as the capability to support hand-off sessions among cellular, Wi-Fi and wireline networks. FMC combines capabilities and services between primarily fixed-UC applications and those that are primarily mobile. For the enterprise, this is defined broadly, but generally refers to the ability to incorporate wired and wireless voice and data communications into a single service, network or device. One aspect may be the ability to integrate mobile phones into the corporate telephony system, which is also called mobile UC.

Position and Adoption Speed Justification: FMC has moved a bit further along in recognition and adoption on the Hype Cycle. In During the past year, Research In Motion (RIM) moved to provide voice over wireless LAN (VoWLAN) support on its new devices, and most smartphones support voice over IP (VoIP) clients for voice and video calling. Companies still are looking to alternative networks like wireless LAN (WLAN) to support voice, and many carriers are relying on Wi-Fi technology to add coverage and capacity as part of their network strategy. As FMC has

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become more defined and known as the intersection between wireless and wireline, it is now considered less mature than purely mobile UC, which may not take advantage of multimode network support. Although awareness and adoption are slowly growing, there are few installations and examples of current uses of FMC, and there are limited offerings worldwide from communication service providers.

User Advice: FMC should still be an option for in-building coverage, where cellular networks just don't reach well. It is still less of an option over public WLAN systems, because quality of service is very low. Look to FMC as the way to increase coverage for in-building services using WLAN and to support work-at-home employees on a single device, either handheld, notebook or tablet PC. FMC can potentially help reduce costs by consolidating services and devices. Today, third-party, on-premises-based IP systems from companies like Avaya or Cisco need to be supported, so look to devices that are vendor- and device-neutral. For those that have consolidated PBX vendors, support may already be present.

Business Impact: The business case for FMC is still difficult to define. FMC can revolutionize corporate telephony, providing one device and one service (consolidating fixed and mobile). It should also reduce redundant network transportation costs as traffic moves from wired to wireless, but special pricing for these services is a prerequisite. FMC continues to be more about supporting mobility and better coverage, and less about cost savings.

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: AT&T; Siemens Enterprise Communications; T-Mobile USA; Varaha Systems; Verizon; Vodafone Group

Recommended Reading: "MarketScope for the Enterprise Mobile Communication Gateway"

"IT Market Clock for Enterprise Mobility, 2010"

"Top U.S. Telecommunications Service Provider Enterprise Trends, 2010"

"How to Leverage SIP Trunks, Session Border Control and Session Management for Cost Savings and UC Deployment"

Mobile Consumer Application Platforms

Analysis By: William Clark; Michael J. King

Definition: Mobile consumer application platforms (MCAPs) include a wide range of infrastructures, tools and distribution capabilities that enable consumer-facing enterprises to build, test, deploy and support mobile applications for a variety of devices. Application architectures supported include:

- **Messaging-Based** — For example, Short Message Service (SMS), Multimedia Messaging Service (MMS), and mobile email outbound and return applications.

- **Browser-Based** — This involves thin clients, ranging from rudimentary Wireless Application Protocol (WAP) to full mobile browsers, such as Safari, Pocket Internet Explorer (Pocket IE) and Opera, with scripting and access to on-device resources.

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- **Thick Clients/Rich Clients** — This includes native applications (e.g., Apple, Symbian, Windows Mobile, Palm and BlackBerry); high-end Java Platform, Micro Edition (Java ME); and Binary Runtime Environment for Wireless (BREW).

- **Streaming Audio/Video** — Examples include Adobe Flash and Microsoft Silverlight, which provide rich animation and interactivity on the client device.

Gartner has observed that more-sophisticated applications and services, which blend the first three types of architecture, have become more prevalent in the past two years. We expect this trend to accelerate during the next three years; hence, these disparate technology bases will be drawn closer together to support more-sophisticated use cases. The streaming use case will continue to be initiated by one of the other three, but still requires special tools and thought concerning how those platforms will craft user experiences. Device- and OS-specific platforms (such as Apple's combination of tools, handsets and application stores) and device- and OS-independent platforms (such as broad SMS platforms and cross-compilers for multiple OS platforms) will thrive. Both will pose design challenges in sourcing consumer-facing applications on mobile devices.

Position and Adoption Speed Justification: The rapid growth of smartphones and the increased capabilities they offer will cause them to quickly become primary computing platforms for consumers in North America, Asia and Western Europe. In 2010, activity increased involving cross-platform tools, including mobile enterprise application platform (MEAP) vendors crossing over to support consumer applications and new venture-backed vendors. The growing requirement for enterprises to reduce customer interaction costs, coupled with the comfort level that most consumers younger than 30 have with SMS and mobile browsing, will increase the adoption of these technologies during the next two to five years.

Most of these platforms support one or the other, but over the long term (two to three years), a single infrastructure will support and integrate experiences across multiple channels. In three to five years, MCAP functionality will begin to overlap MEAP functionality, requiring deeper application infrastructure integration, and HTML5 will bring this further together.

User Advice: Always think of user interactions in terms of their styles — thick, thin or messaging. Investigate native platform development tools for streaming and thick for most popular platforms, or for those that require high-performance. Devise a thin-client application strategy to service the remaining customer base. Recognize the immense installed customer base for SMS and the attractive segment of mobile email users. Reconcile investments against current CRM and e-commerce investment profiles. Assess MCAP vendors' ability to provide analytics and integration with other platforms.

Business Impact: MCAPs are significant for consumer-facing companies, government agencies, telecom, financial services firms, and utilities with requirements for increased communication with customers' constituents and users — the impact can be measured by improved click-through, page views or messages delivered.

Benefit Rating: Transformational

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Appcelerator; mBlox; Microsoft; Motricity; Netbiscuits; Openwave; Sybase; Volantis

Recommended Reading: "Magic Quadrant for Mobile Consumer Application Platforms"

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VoIP Wireless WAN

Analysis By: Phillip Redman

Definition: Wireless network service providers deliver voice over circuit-switched technology, rather than the packet-switched technology they use for data transmissions. The next-generation technology using Long Term Evolution (LTE) is the first all Internet Protocol (IP) network, which will include support for voice. Voice standards over LTE haven't been fully decided on yet, with most providers looking to the voice over LTE (VoLTE) standard. In February 2010, led by the Global System for Mobile Association (GSMA), many in the industry came forward to support VoLTE. The GSMA's VoLTE initiative has the backing of more than 40 organizations across the mobile ecosystem, including many of the world's leading mobile operators, handset manufacturers and equipment vendors. They support the principle of a single Information Management System (IMS)-based voice solution, which will be run over LTE. This is the reverse of what was proposed by a contingency looking to evolve using voice over LTE via Generic Access (VoLGA).

The use of IP in the wireless link for packetized voice transmission (as compared with circuit-switched transmission) comprises a voice over IP (VoIP) wireless wide-area network (WWAN). Although this isn't being supported today, during the next few years, Gartner expects initial rollouts of this service.

Position and Adoption Speed Justification: With the launch of LTE, network carriers took a step forward toward supporting voice over WWAN (VoWWAN). However, LTE networks are only now being deployed. Low-cost alternatives to support voice still abound, and most calls worldwide are still going over second-generation (2G) GSM systems, which are ubiquitous and offer low-cost calling. It will still be four or five years before the transition away from 2G voice to third-generation (3G)/LTE voice support begins. In the end, voice traffic is will be subsumed by the increasing data traffic, so much of the focus and revenue will be directed toward data capabilities, rather than on the voice for these networks.

User Advice: Although some smartphones support VoIP clients that can use 3G networks, current high-speed networks support VoIP, but without quality of service, which results in lower quality and an inconsistent experience. Some operators continue to use VoIP for push-to-talk over cellular services, but it is not supported for cellular calling. Look to third-party fixed mobile convergence (FMC) systems to support handoff and higher-quality voice.

Business Impact: There is still little use of VoWWAN capabilities. Many companies have begun to support VoIP and are looking for the same support outside their offices. Consumer users of popular VoIP services also want to extend that capability to their mobile phones. VoIP could add 20% to 40% in additional capacity on all IP networks, which could drive costs lower to support wireless voice services. VoIP also could support many softphones, which will increase the number of devices that support mobile voice capabilities, and it can also enable the simultaneous use of voice and data on a device. It is also the main technology to support FMC and mobile unified communications.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: AT&T; fring; Most cellular infrastructure vendors; Skype; Verizon

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Smartphone Hypervisors

Analysis By: Monica Basso

Definition: Smartphone hypervisors are thin layers of virtualization software running directly on smartphone hardware that define one or more processing environments. Initially, they are being used to reduce the number of discrete processors by defining multiple virtual processors on a single, physical die. As the technology evolves, it will be used to improve the standardization, manageability and security of the application environment.

Position and Adoption Speed Justification: Business drivers for the adoption of hypervisor technology in smartphones include:

- Improves the time to market for new products and contains costs — for handset manufacturers.

- Addresses the security challenges posed to networks by an increasing number of intelligent mobile devices and third-party applications — for mobile operators.

- Exploits new capabilities offered by cloud computing on mobile devices — for service providers, in general.

- Enforces IT security and management policies on personal-owned devices — for enterprises.

- Enables cross-platform application portability (e.g., .NET applications to Android devices) — for enterprises.

Smartphone hypervisors appeared in 2006, and first shipped in production smartphone models from HTC and Toshiba in late 2007. Development efforts increased significantly during 2007 and 2008, resulting in heightened interest from smartphone vendors and suppliers of smartphone microprocessors. VMware's acquisition of Trango Virtual Processors (November 2008), and Citrix Systems' investments and partnership with Open Kernel Labs (January 2009), validate market interest. Market developments started in 2010, with ARM's new Cortex-A class microprocessor designs that have TrustZone, a standard mechanism to enforce hardware virtualization that can be exploited to create separate virtual machines to make applications more trustable. Due to the presence of ARM's TrustZone capabilities, more than 50% of smartphones shipped during 2010 had hardware virtualization features. By the end of 2012, this figure will rise to 90%. By 2013, all smartphone OSs will introduce support for virtualization functions and the potential standardization, manageability and security benefits of hypervisors. Hypervisors will help drive standardization for each OS, but are unlikely to improve interoperability among different OSs.

One issue is the processing overhead imposed on the application environment, which is already performance-constrained. Improvements in processing capability and the gradual integration of virtualization technology into smartphone processors will make hypervisor functions more appealing.

User Advice: Monitor developments in smartphone processors for signs of when and how virtualization technology will be added to smartphones and other mobile devices. Once smartphones with hardware-assisted virtualization capabilities appear in the market, plan for the approach to become mainstream within two years.

Business Impact: Smartphone hypervisors will not deliver improvements in the manageability and security of smartphones until smartphone OS vendors also embrace and fully support them, which is unlikely to occur before 2013. Through 2012, continue to pursue established management and security initiatives.

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Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: ARM; Open Kernel Labs; VirtualLogix; VMware

Recommended Reading: "Smartphone Virtualization: Making Mobile Applications More Trustable "

"The Emerging Market for Smartphone Hypervisors"

"Cost Reduction Drive Will Bring Hardware Virtualization to Smartphones"

"Virtualization Will Simplify Smartphone Deployment"

Mobile Collaboration Client

Analysis By: Monica Basso

Definition: A mobile integrated-communication client is a range of personal communication and collaboration capabilities that converge into a single-client application on a mobile device, providing users with an enhanced and integrated experience. Short Message Service (SMS), email, instant messaging (IM), social networking, Really Simple Syndication (RSS) news, telephony, presence and activity streams are integrated into a single-client application screen. For example, from an email client, a user can post his or her status to multiple social networks; or a contact list's entry is enhanced with active links to social networks to which the contact person belongs. Presence and status information are mediated from multiple sources and integrated in the device's applications.

Position and Adoption Speed Justification: Working with multiple mobile communication applications, such as voice, email, IM, SMS and social networks, on a phone isn't easy. Different clients, contact details and message repositories increase complexity, while integration is often limited. This fragmentation is being progressively reduced as multiple communication capabilities converge into a single, presence-enabled messaging client on mobile devices. Convergence is developing at the client side, hiding technology complexity from users and letting them focus on messaging content only. The user experience on a mobile client will be enhanced, thanks to a blend of cloud services from multiple providers. This dynamic is similar to that occurring on PCs with fourth-generation collaboration clients.

Multiple vendors, from handset manufacturers to mobile open-source software (OSS) and application vendors, will contribute to this area. Each will take a slightly different path, depending on core competencies. No single vendor has developed complete support for integrated communications on a mobile device; however, a number of players have taken steps in that direction. Microsoft's Windows Phone 7, Research In Motion's BlackBerry OS 7, Nokia's Symbian Anna and Palm's Synergy on Palm Pre devices all support integrated messaging capabilities for SMS, email, IM and presence, social information (e.g., from Facebook and Twitter), to different extents on their devices. They can integrate multiple calendar and contact information from corporate and public services into a single view.

This technology is a step forward, and it augments today's approaches to unified collaboration and communications (UCC), which are deployed on the corporate server side. Not only can it more easily take advantage of contextual information originating in mobile devices (e.g., location), but it can also more easily blend corporate and personal services (e.g., public social networks or

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email services), based on the individual's presence. Since it connects personal and professional data, this convergence is also creating potential security and privacy risks.

User Advice: Explore emerging mobile, personal integrated-communications capabilities that will emerge in mobile applications to enable a richer, real-time communications and collaboration experience for your users. Be careful with actual performances that might affect user experience, as some implementations are still partly unstable.

Business Impact: The availability of integrated messaging capabilities on mobile devices will increase the usability of mobile tools, driving further adoption among employees. It will also make mobile workers more productive and more responsive to client requests and collaboration within the organization.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Apple; Google; Microsoft; Nokia; Palm; Research In Motion; Xobni

Recommended Reading: "Findings: Mobile Messaging Becomes Part of Unified Communications and Collaboration"

"Wide Array of Communications Overwhelms Users"

Mobile BI

Analysis By: Andreas Bitterer

Definition: With the rapidly increasing mobility of the workforce, mobile business intelligence (BI) is a new, or rather renewed, focus area for BI vendors, and BI customers are excited once again about the potential possibilities. In prior years, vendors attempted to leverage the laptop as the endpoint device, pushing online analytical processing (OLAP) cubes onto the PC platform for disconnected reporting and analysis, with very limited success. Today, with new software delivery modes and applications on smaller form factor devices, such as smartphones or the new tablets, BI vendors are once again attempting to explore those market segments. Mobile BI capabilities will be initially focused mostly on reporting and dashboarding; however, limited write-back capabilities from the mobile platform to the back-end are also available. An interesting new user experience will be the ability to navigate around and drill into reports through touchscreen interfaces and finger gestures, such as tapping, squeezing or swiping through the content. In addition, the location awareness of mobile devices will lead to a whole new set of use cases with new roles that have traditionally not been expected as "BI users."

Position and Adoption Speed Justification: Mobile BI, while not a new idea, is more or less starting from scratch, but rarely has the BI market seen such a sudden and huge spark of interest in a new BI capability, with the hype engine at full speed. That is why mobile BI is positioned at the Peak of Inflated Expectations. While general interest in the topic is very high, adoption is expected to be relatively sluggish. While mobile devices are flying off the shelves, and every knowledge worker has at least one mobile device, sending potentially sensitive data to a mobile phone half-way around the world will not become mainstream anytime soon. At the same time, many organizations are still struggling with rather mundane BI issues and are not necessarily ready to invest huge sums in yet another idea, however cool it may appear. Mobile BI is great demoware, particularly on the iPad, but only a few implementations are already under way. For the time being, we expect a flurry of development efforts by the vendor community trying to grab attention and position the mobile device as an attractive BI delivery mechanism. However, end-

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user organizations will carefully invest in a new platform for all their employees and will likely enable only a small user group to test the viability of the new generation of mobile BI applications and devices.

User Advice: The Apple iPad has become a runaway success with top management and is currently considered the ultimate executive gadget. To that end, the cool new tablet devices may work as a means to inject new life into stumbling BI initiatives. While there are alternatives, there are reports of companies buying hundreds of iPads to be distributed to the top management ranks, despite no plan being in place as to what to do with those devices. Organizations that can identify use cases in which mobile users have a need for easy access to up-to-date information held in back-office applications or data warehouses should run a small pilot testing the mobile BI applications. Only when it is proven that new tablet devices, whether an iPad, Playbook, Xoom, or Galaxy Tab, have had a positive impact of faster decision making leading to quantifiable business benefits should a larger deployment be considered. However, the main infrastructure, consisting of the data warehouse, BI platform, data integration and, of course, data quality, must be in good shape before you even start to think about mobile BI. There is no point supplying modern devices to a mobile workforce so they can get access to BI anywhere when the submitted data is all wrong.

Business Impact: Decision making is not something only for the back-office or the boardroom. Decisions are being made on the road, in a warehouse, in a supermarket, in client meetings or in airport lounges, where the decision maker often only needs quick access to a few key metrics shown on a mobile device. This can reduce decision bottlenecks, increase business process efficiency and enable broader input into the decision at hand.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: IBM; Information Builders; MeLLmo; MicroStrategy; Oracle; Pentaho; QlikTech; SAP BusinessObjects; Targit

Mobile Cloud Synchronization

Analysis By: Monica Basso

Definition: Cloud synchronization allows mobile devices to automatically and transparently synchronize local information and applications with a Web-based, in-the-cloud service to the user in real time. Information spans contacts, calendars, email and text messages to pictures, videos, music, documents and other media. Service offerings include data backup and federation of social networking information into a single application.

Position and Adoption Speed Justification: Most offerings come from mobile players: Nokia offers Ovi Services (to be rebranded Nokia Services); Apple offers MobileMe and, later in 2011, will launch iCloud; and Microsoft offers My Phone. Others include AOL Sync, based on Synchronization Markup Language (SyncML) and Funambol's open-source platform. Google Sync (based on Exchange ActiveSync [EAS]) will help Google Apps users synchronize contacts and calendars (but not email) between Web services and their smartphones.

Smartphones are powerful platforms that hold large amounts of data and multimedia content. They run multiple applications and support the Web 2.0 experience through enhanced browsers. People increasingly deal with multiple devices that run a portion of the same data (such as music, email, contacts and pictures). This makes traditional synchronization approaches between mobile devices and a PC somewhat inconvenient for users. Updating content on devices or persistently

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storing data on a PC is burdensome and complex for users. Web-based synchronization services for mobile devices simplify the user experience, and grant content and application availability across multiple platforms.

Cloud synchronization — with automatic, real-time and transparent data synchronization between mobile devices and the Web — is emerging as a service from key mobile players. Google Sync is an accelerator for this transformation that goes beyond email, calendar and contacts to synchronize personal content on a phone with cloud-based services. Google plans to complete support for in-the-cloud mobile synchronization with future Android developments.

Mobile operators are also launching synchronization services to their subscribers, independent of the mobile device platform. Finally, service providers, such as Dropbox, provide personal cloud synchronization to transfer data among multiple devices.

Multiple challenges lay on the path to cloud synchronization development — from the complexity of implementations across multiple device platforms to performance issues with battery life and transmission costs. Quality of service is also critical to succeed with cloud synchronization, because this is the factor on which users build their trust and reliability with the service provider. Last year's failure of Nokia's Ovi Contacts service, with major losses in the contact database, clearly indicates that this is a challenging area and requires full attention from the provider.

The development of cloud synchronization services will continue beyond 2012, offering a growing range of possibilities for mobile-device users to effectively store and manage their personal data and content through services in the cloud, independently of any physical device, such as smartphones or PC memory storage. Plan to use cloud synchronization services for your mobile workforce to improve the user experience and optimize costs in mobility investments.

User Advice: IT organizations should evaluate emerging cloud synchronization services in the consumer space to complement their corporate mobile applications. IT organizations should also monitor commoditization trends in mobility markets to identify areas of deployment where low switching costs can be exploited to drive infrastructure and operational cost reductions.

Vendor organizations should plan to support emerging standards in cloud synchronization — such as SyncML as an open standard and ActiveSync as a de facto standard — to support increasing market demand for interoperability among mobile devices and services.

Business Impact: Cloud synchronization will bring value to mobile workers who will no longer need to manually synchronize their devices with specific PC programs, but, instead, will rely on transparent services to automatically keep them up to date. This will also reduce the demand for IT support.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: AOL; Apple; Dropbox; Funambol; Google; Microsoft; Nokia; Yahoo

Recommended Reading: "Google Sync Makes a Step Toward Cloud Synchronization for Mobile Devices"

"Collaboration and the Cloud Will Transform the Wireless E-Mail Market"

"Magic Quadrant for Enterprise Wireless E-Mail Software Market"

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Mobile Unified Communications

Analysis By: Phillip Redman

Definition: Mobile unified communications (UC) is the integration of UC components (such as single unified corporate number, presence and status) on wireless mobile devices. The term "fixed-mobile convergence" (FMC) originally described a specific subset of what was considered mobile UC, and usually referred to the use of voice over IP (VoIP) over Wi-Fi and cellular convergence. However, the definition of FMC has been expanded to the point where FMC is synonymous with the term "mobile UC," which is focused on the integration of mobile devices into the enterprise telephony system. Mobile devices typically used are single-mode cellular devices, Wi-Fi phones, and dual-mode Wi-Fi phones that roam between the cellular and enterprise networks or media tablets. The integration of mobile phones into the fixed voice system is a critical component of mobile UC.

Position and Adoption Speed Justification: Enterprises continue their evolution to adopt Internet Protocol (IP)-based voice systems that have integrated wireless device support. Companies can choose to integrate mobile phones using enterprise mobile communications gateways (third-party vendor-neutral systems) or via a UC infrastructure. Enterprise adoption of incorporated mobile elements varies by region, but is limited to date. However, interest continues, and as more smartphones penetrate the business world, it will be easier for enterprises to put smartphones on the corporate voice network. As companies move to more-unified telephony systems, this will also help drive support and adoption.

User Advice: Our recommendations are unchanged from last year. There is significant value to integrating your mobile phone into the corporate network. Users would benefit from having their mobile phones become part of the enterprise voice and data infrastructure. Work closely with users to identify business functions and roles that can benefit from mobile UC. As the enterprise telephony plan emerges, evaluate users' mobility requirements and their need to integrate wired and wireless communications into a single device. Address the needs of your mobile users first, and then evaluate support presence, status and click-to-conference call applications that will improve use and productivity. Look to incorporate mobility into next-generation IP telephony projects and eliminate desk phones for those mobile users. Many companies are looking at supporting individually owned devices for their users. Doing this may make it more difficult to integrate and support mobile UC, since access may be limited and is not recommended for companies pursuing a mobile UC strategy.

Business Impact: Mobile UC has enormous potential to change the way companies plan and support communications services. As a capability to extend enterprise voice system functionality to mobile devices, consolidate wired and wireless services, and eliminate desk phones. Mobile UC can transform how vendors support communications for mobile users in the enterprise.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Avaya; Cisco; CounterPath; Motorola; Research In Motion; ShoreTel; Tango; Telepo; TeleWare

Recommended Reading: "IT Market Clock for Enterprise Mobility, 2010"

"Top U.S. Telecommunications Service Provider Enterprise Trends, 2010"

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"How to Leverage SIP Trunks, Session Border Control and Session Management for Cost Savings and UC Deployment"

"MarketScope for the Enterprise Mobile Communication Gateway"

Sliding Into the Trough

Mobile Satellite Services

Analysis By: Jay E. Pultz

Definition: Mobile satellite services (MSS) provide two-way voice and data communications to global users who are on the go or in remote locations; terminals range in size from handheld to laptop-size units. Terminals can also be mounted in a vehicle, with communications maintained while the vehicle is moving. MSS operates at L-band — low enough in the frequency spectrum to avoid the rain fade associated with higher bandwidth Ku- and Ka-band fixed satellite systems. (Note: Ku and Ka bands are used for a limited set of similar applications, but typically have much larger terminals; more focused beams also result in the need for the terminal to track the satellite.)

The genesis of MSS begins with Marisat, and, later, Inmarsat — specialized maritime communications systems that have broadened in use to other applications, such as transportation over time. Beginning in the late 1990s, two MSS systems — Iridium and Globalstar — began offering global "cellular in the sky" capabilities. With an emphasis on voice, these systems overcame the latency problems of geosynchronous earth orbit (GEO) satellites by deploying large constellations of low Earth orbit (LEO) satellites (Iridium has 66 active satellites). Due to the rapid deployment of terrestrial-based cellular, and the relatively large and expensive satellite handhelds — along with usage charges in the $1 per minute range — these systems find limited use today, primarily for emergency/disaster communications and where ground-based cellular does not exist.

Today's state of the art is represented by Inmarsat's Broadband Global Area Network (BGAN). With laptop-size terminals that can be set up in minutes, BGAN sends/receives at nearly 500 Kbps anywhere in the world (except for extreme polar regions). BGAN consists of a fleet of three GEO satellites; high latency constrains BGAN use for voice and other real-time applications. Retail prices are typically $2,500 per terminal, $40 per month for service and a $5 per Mbyte usage charge.

Position and Adoption Speed Justification: Voice-oriented LEO services began in the late 1990s. Given service improvements and several generations of terminals, these systems are mature. Today's operational broadband MSS are owned by Inmarsat — BGAN and similar systems specialized for the needs of the maritime and transportation industries. (In addition to the private sector niche filled by MSS, the public sector — particularly government agencies with worldwide operations — make heavy use of MSS.) Inmarsat's broadband services went into global operations in early 2009 (regional coverage began several years earlier); again, these systems are mature.

The original dream of MSS — data rates in the multiple Mbps available anywhere in the world, with low latency and at competitive prices to 3G/4G — remains just that, a dream. Future systems include Iridium's Next — a LEO MSS with greater capacity than the current system (satellite launches are currently scheduled to begin in 2015). The potential exists for new breakthrough approaches, but these are likely more than 10 years away. Hence, our maturity evaluation concerns existing capabilities.

User Advice:

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- Utilize MSS to provide remote users with sufficient bandwidth to perform most business processes.

- Due to high costs, MSS should only be deployed where needed, and usage charges should be closely monitored.

- Don't expect rapid future improvements in MSS, and expect delays in new plans (new satellite operations can be delayed by developmental problems, capital constraints, the availability of suitable launch vehicles and other factors).

Business Impact: MSS can extend enterprise operations to nearly anywhere on the planet — at data speeds acceptable for many business applications.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Globalstar; Inmarsat; Iridium

Mobile VoIP

Analysis By: Charlotte Patrick

Definition: Mobile voice over Internet Protocol (mVoIP) offers packet-switched voice communications over a radio access network and can be offered by a communications service provider (CSP) or by a third-party provider (such as Skype).

mVoIP is usually integrated with other services in one of two different ways:

- **Mobile Unified Communications (MUC):** The mVoIP call is initiated from a software client on the consumer's device. The client provides the user with multiple communication methods — typically, voice, instant messaging and video. One example, is the Skype application, which can be downloaded from major application stores.

- **"Voice Within Experience":** mVoIP becomes a seamless part of a mobile application that does not focus specifically on voice communication. For example, a consumer could make an mVoIP call from a mobile social networking application such as Facebook or call a company using click-to-call functionality from inside their mobile application.

Please note that we distinguish these types of mVoIP from the future efforts of CSPs to move to an all-IP delivery of voice with the introduction of Voice over Long Term Evolution (VoLTE).

Position and Adoption Speed Justification: mVoIP is moving down the curve as mVoIP clients become more readily available to developed-market customers, due to the increasing penetration of smartphones. Uptake will continue to increase in the next five years thanks to improving call quality and as networks are upgraded to High-Speed Packet Access Evolution (HSPA+) and LTE. However, inhibitors such as CSPs blocking or charging extra for them will provide regional barriers in the short term.

The proportion of mobile users that will use mVoIP regularly when it reaches the Plateau of Productivity is dependent on a variety of factors for each of the two products.

MUC Clients — The current rise in interest among younger consumers for mobile instant messaging will mean that mVoIP becomes increasingly available on the devices of consumers in this segment as more and more MUC clients are downloaded. This is unlikely to be an easy

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revenue-generation opportunity for over-the-top providers, though, as this segment's usage of mVoIP will be dependent on member-to-member calling remaining free. However, if downloadable MUC clients see "viral" takeup in a country, it is likely that a good proportion of younger consumers will move to mVoIP for voice communications between their closest friends.

Attracting more profitable segments to mVoIP will require over-the-top providers to continue to exploit price arbitrage opportunities in the international and roaming markets — focusing attention on attracting travelers and immigrant communities. In addition, the inclusion of mobile video into clients increases their attractiveness to a broader audience. However, these opportunities are, today, limited by the cost of using mobile data while abroad and, in future, by CSPs' moves to include international calls in their bundles.

Lastly, the in-factory uploading of clients by device manufacturers will also drive this market. To date, powerful manufacturers such as Apple have placed clients on devices, whereas others have held back from going head-to-head with CSPs. We expect this to remain the status quo in the short term.

Voice Within Experience — We do not have any strong indicators yet about the likely success of these initiatives. Placing mVoIP within fixed websites has seen some success to date (for example, integrating voice into multiplayer online games and into dating sites), but it has also had high-profile failures (for example, eBay's issues finding synergies after its purchase of Skype). One of the biggest question marks that remains is whether consumers will see benefits from using voice from within their social networks. We have recently seen Microsoft spending $8 billion on Skype, presumably with a view to exploiting this type of revenue opportunity (primarily on the fixed side, but also, potentially on the mobile, in future).

User Advice:

- Mobile CSPs need to monitor the usage of mVoIP clients by their highest value customers (especially those that roam regularly) and make appropriate adjustments to their future revenue and margin forecasts. Once regulatory pressures bring down the cost of roaming data, these users will have to be encouraged to stay with large, all-you-can-eat packages.

- Mobile CSPs with small market shares looking to build up the quality of their customer base should consider working with Skype as a way to reach higher average revenue per unit (ARPU) customers. Anecdotal evidence from CSPs already working with Skype suggests that customers wanting integrated Skype products tend to be better value than average.

Business Impact: The first benefit of mVoIP to consumers is much the same as seen in the fixed VoIP market — inexpensive or free calls to otherwise expensive destinations. The degree of this benefit will depend on the activities of CSPs in bringing down margins on these call types.

The second benefit concerns the integration of mVoIP into different mobile applications; although the amount to which consumers will value this is not yet clear. For example, anecdotal evidence from vendors suggests that there are examples where consumers find huge utility in fixed VoIP (including in multiplayer online games, where billions of minutes are already generated each year). But in other cases — for example, putting fixed VoIP into dating websites — volumes generated are relatively small, as users like the idea of the service but do not tend to use it much. We may therefore see companies putting mVoIP voice into their mobile applications to add additional richness or new customer care channels, but with only a small proportion of these generating significant volumes.

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In summary, mVoIP looks set to erode high-margin CSP mobile voice revenue, such as international and roaming; its effects working in parallel with regulatory moves to bring down international interconnect charges. Question marks remain around its effects on domestic calls, with younger segments looking more likely to use it as part of a MUC client. Also, there remains uncertainty around the impact of its integration into social networks, and this may pose an additional significant challenge to the future voice revenue of CSPs.

Holding back the progress of mVoIP are the limited revenue opportunities for over-the-top providers. Advertising has good potential but, as previously, the demographics most interested in inexpensive calling may be less attractive to advertisers, and initiatives to provide ad-funded mobile calling from providers such as Blyk have not been particularly successful. We also expect CSPs to work hard to retain their higher ARPU international traveler customers.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: fring; Google; Jajah; Rebtel; Skype

Recommended Reading: "Emerging Technology Analysis: Mobile Portal VoIP, Global Consumer Communications Services"

"Market Insight: Over-the-Top mVoIP Poses Threat to Traditional CSP Mobile Voice"

"Competitive Landscape: Mobile VoIP for Consumers"

Mobile WLAN Access Points

Analysis By: Jon Erensen; David A. Willis; Michael J. King

Definition: Mobile wireless LAN (WLAN) access points allow WLAN-enabled devices to connect to the Internet by using a third-generation (3G)/fourth-generation (4G) cellular or WiMAX connection. This capability can be part of a stand-alone mobile access point, such as the MiFi devices from Novatel Wireless, or a feature of an existing portable device, most likely a smartphone. The stand-alone access point or smartphone is recognized by the WLAN-enabled device as a typical wireless hot spot, and a connection is established using the WLAN. The difference compared with a typical WLAN access point is that a mobile WLAN access point uses a 3G/4G cellular or WiMAX connection instead of a Cable or DSL broadband connection to the Internet.

Position and Adoption Speed Justification: Mobile WLAN access points were first introduced in the U.S. in mid-2009 by Novatel Wireless and have expanded to include many different carriers and regions. In addition to the dedicated mobile WLAN access points, high-end smartphones are increasingly incorporating this technology as a feature, and that has the potential to significantly increase adoption. Mobile WLAN access points can be used as an alternative to accessing the Internet through a digital cellular connection. They allow an end user to pay for one digital cellular contract and then connect multiple devices using Wi-Fi, instead of paying for a digital cellular connection for each device individually. This can save end users money by limiting the number of wireless data plans they need to pay for, and it can also allow them to forgo an embedded digital cellular connection and rely on Wi-Fi only. This can amount to significant savings in the cost of hardware. For example, an iPad with a 3G connection costs $129 more than a Wi-Fi-only iPad. This is especially important as the number of potential devices with digital cellular connections increases. Notebook PCs, media tablets, video game handheld devices and e-book readers are all adding digital cellular connections, but they are not standard features. But there are potential

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hurdles ahead. If this feature is widely adopted, it has the potential to significantly increase data use on wireless networks, which could impact the overall performance of those networks. And with carriers switching to use-based pricing, this could be expensive, depending on the number of devices a user connects and the amount of data used. Using a smartphone-based mobile WLAN access point solution can drain the smartphone battery. With dedicated hardware such as the MiFi, the battery life is also limited, although you can charge most dedicated devices through a USB port if you are using it with a notebook PC.

User Advice: Device manufacturers should consider embedding mobile WLAN access point technology into products including smartphones, media tablets and notebook PCs with cellular connections. We expect this technology to become a common feature on high-end devices as handset vendors and wireless carriers look to differentiate their products and increase average revenue per user.

For corporate users and consumers that have the need or desire to connect multiple portable electronics to the Internet where a fixed access point is not available, a mobile WLAN access point has the potential to be more cost-effective than paying for individual connections. It also can lower the cost of the device itself, because a user would require WLAN but not a 3G/4G cellular or WiMAX connection. Users also need to understand the data plans and pricing for mobile WLAN access points to avoid excessive fees.

Business Impact: Mobile WLAN access points have the potential to lower data fees for users that use multiple devices, limit compatibility issues and lower the hardware cost by requiring only WLAN in devices rather than 3G/4G cellular or WiMAX connections. Adoption of mobile WLAN access points will give users flexibility in accessing the Internet from multiple devices without having to pay for an Internet connection for each individual device.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: 1010data; Apple; Cradlepoint; HTC; Huawei; LG; Motorola; Novatel Wireless; Palm; Samsung Electronics; Sierra Wireless; ZTE

Near-Field Communication

Analysis By: Ken Dulaney

Definition: Near-field communication (NFC) is a short-range, wireless connectivity technology designed to interact with consumer electronics, mobile devices and PCs. NFC operates using magnetic field induction, and has tag and reader functionality. NFC encompasses three modes: tag reading, card emulation and peer to peer.

Position and Adoption Speed Justification: NFC initially will be most useful for authorization (e.g., wireless password entry), personal ID, file sharing and smart tags. Later, it will be useful for access control and processing financial transactions as a contactless payment card activated by swiping a device near a receiver terminal. NFC is immature and may experience threats from many other technologies. It does not compete with Bluetooth, although it can be used as a token to set up the connection. NFC is a subset of RFID except that it contains a tag and a reader, facilitating two-way communications. NFC's range is 10 cm, while other RFID supports 10 meters. A noteworthy implementation is the Oyster card in the U.K., used on the transportation system, which today employs contactless technology. The U.K. is converting Oyster to be NFC-compliant, showing the momentum behind the technology.

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A battle has emerged between mobile operators and banks to become the trusted service manager and to provision secure applications on the security coprocessor used in NFC financial transactions. Mobile operators prefer the subscriber identity module (SIM) card, while banks prefer micro-Secure Digital (SD), a second SD flash memory card tied to the bank. No near-term resolution appears in sight globally. Many trials of NFC are under way, but the gap between trial and deployment remains problematic, because of the costs for rollout and poor consensus among competing banks and financial institutions that would use the card.

While NFC provides a superior experience to a credit card, due to the fully electronic path used to process payments, it is unclear that, despite the pervasiveness of mobile phones, the market will move quickly to embrace NFC over credit cards. Credit cards are so well-established, not only from the individual ownership perspective, but also from an infrastructure perspective that changes are considered expensive by those who must be involved in the transition (e.g., banks). Given that the cost of fraud is well-understood by financial institutions, and is a relatively level expense, the move to a more-secure electronic method will take greater incentives than we have today.

A number of vendors have publicly announced their intention to include NFC in future phones shipped this calendar year, specifically Research In Motion (RIM), Samsung and Nokia. Various consortiums (such as the AT&T, Verizon, Barclays and Discover venture named ISIS) have been announced to further the technology. Adoption of NFC could be enhanced if NFC technology is combined with Bluetooth, Wi-Fi, GPS, or combinations thereof, a direction being discussed in the industry. NFC will appear in a number of smartphones, and while mobile payments and access control are challenged as already described, NFC will perform other valuable tasks, replacing quick response (QR) codes for quickly referencing Web data, interchanging information and as an inexpensive means of achieving what RFID does at a much higher cost (due to higher cost readers).

User Advice: Monitor the technology, especially in North American markets, which are considered the center of innovation for the technology. Worldwide trials have been sporadic but increasing, and are expected to increase as handsets become more available. NFC has been used in some mobile payment schemes in other regions, and could emerge quickly if critical mass and standards evolve.

Business Impact: NFC will enable contactless interaction between computers and peripheral devices. In the coming years, nonpayment applications will establish NFC. However, NFC will be deemed successful only if it succeeds for mobile payments via smartphones.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Nokia; NXP Semiconductors; Samsung

Mobile Data Intelligence

Analysis By: Carolina Milanesi

Definition: The goal of mobile data intelligence (MDI) is to measure, collect and analyze mobile data usage, allowing marketers to better understand user behavior and interest toward devices and data services.

Position and Adoption Speed Justification: MDI helps businesses that seek to understand mobile users' usage patterns across multiple services. It is also becoming a key factor for

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communication service providers, which can use the data to maximize their return on investment to attract new subscribers, win over existing subscribers to new products and services, or retain the overall installed base. One of the most important objectives for mobile operators is to improve uptake rates while minimizing costs. To do so, operators need much more intelligence about how people use data services, and to understand which variables have the greatest impact on service.

This is not quite like mobile BI, which tends to be more enterprise-focused than consumer-focused.

Some mobile vendors such as Nokia and Samsung have been analyzing some of the data on mobile devices such as what features and applications users were using most. However, MDI is a relatively new trend aided by the proliferation of smartphones that allows for the tools needed to run this analytic to be run on a wider range of devices.

User Advice: Communication service providers should use MDI to analyze user behavior, especially around smartphones and tablets to evaluate the data revenue opportunity in these two device categories to properly invest in subsidies on the most profitable devices.

Advertisers and other B2C-focused businesses could use MDI to measure responses to advertizing and to services offered over mobile devices to create more effective tools.

Business Impact: MDI helps to drive better marketing by delivering information on users' behaviors and preferences.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Neuralitic; Tekelec; Umber

Mobile Device Management

Analysis By: Leif-Olof Wallin; Terrence Cosgrove; Ronni J. Colville

Definition: Mobile device management (MDM) includes software that provides the following functions: software distribution, policy management, inventory management, security management and service management for smartphones and media tablets. MDM functionality is similar to that of PC configuration life cycle management (PCCLM) tools; however, mobile-platform-specific requirements are often part of MDM suites.

Position and Adoption Speed Justification: Many organizations use MDM tools that are specific to a device platform or that manage a certain part of the life cycle (e.g., device lock or wipe), resulting in the adoption of fragmented toolsets. We are now beginning to see more focus on and adoption of MDM tools triggered by the attention and adoption of the iPad. While IT organizations vary in their approaches to implementing and owning the tools that manage mobile devices (e.g., the messaging group, some other mobile group, the desktop group, etc.), there are still very few that are managing the full life cycle across multiple device platforms. Organizations are realizing that users are broadening their use of personal devices for business applications. In addition, many organizations are using different ways to deploy MDM to support different management styles. These factors will drive the adoption of tools to manage the full life cycle of mobile devices.

Gartner believes that mobile devices will increasingly be supported in the client computing support group in most organizations, and become peers with notebooks and desktops from a support standpoint. Indeed, some organizations are already replacing PCs with tablets for niche

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user groups. An increasing number of organizations are looking for MDM functionality from PCCLM tools.

Gartner has moved the position of MDM back (to the left) this year because there are new dynamics that are affecting both the technology and user adoption. While MDM is not new, and some of the technology used to manage mobile devices is not new, what has changed is that, now, IT organizations will be looking to manage more types of mobile devices from a single management framework (or tool). Some IT organizations will be able to extend this capability into their PCCLM tools, as many of the functions will be similar; while, for others, MDM will be in a separate tool due to organizational alignment challenges and the success or failure of their existing PCCLM tool.

User Advice: Organizations already manage notebooks similarly to office PCs; however, the needs of smartphone and media tablet users must be assessed. If your MDM requirements are similar to PCCLM tool capabilities, PCCLM tools should be leveraged wherever possible. Many PCCLM tools do not have strong mobile device support, so third-party tools may be required for at least the next two years to automate those functions and other mobile-device-specific functions, such as device wipe.

Business Impact: As more users rely on mobile computing in their jobs, the number of handheld devices and media tablets used for business purposes is growing, especially with the introduction of the iPad. Therefore, MDM capabilities are likely to become increasingly important. Mobile devices are being used more frequently to support business-critical applications, thus requiring more-stringent manageability to ensure secure user access and system availability. In this regard, MDM tools can have material benefits to improve user productivity and device data backup/recovery. Initially, the benefits will be visible mostly in sales force and workforce management deployments, where improved device management can increase availability and productivity, as well as decrease support costs. In the short term, MDM tools may add significant per-user and per-device costs to the IT budget. Companies will be at odds to allocate funds and effort to put increasing numbers of devices under management that seem far less expensive than notebooks and may be owned by the user. The needs for security, privacy and compliance must be understood as factors beyond user choice, and must be recognized as a cost of doing business in a "bring your own device" scenario.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: AirWatch; BoxTone; Capricode; Excitor; FancyFon Software; Fiberlink Communications; Fixmo; Fromdistance; Good Technology; Ibelem; McAfee; Mobile Active Defense; MobileIron; Motorola Solutions; Odyssey Software; Smith Micro Software; SOTI; Sybase; Symantec; Tangoe; The Institution; Zenprise

Recommended Reading: "Magic Quadrant for Mobile Device Management Software"

"Mobile Device Management 2010: A Crowd of Vendors Pursue Consumer Devicesin the Enterprise"

"Use Managed Diversity to Support Endpoint Devices"

"The Five Phases of the Mobile Device Management Life Cycle"

"Microsoft's Mobile Device Management Solution Could Attain Long-Needed Focus"

"Mobile System Management Vendors Consolidate Across Configuration Markets"

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"Toolkit Best Practices: Plan for Convergence of Mobile Security and Device Management"

"Toolkit: Are You Ready for the Convergence of Mobile and Client Computing?"

"Toolkit Decision Framework: Mobile Device Management in the Context of PC Management"

"Toolkit Decision Framework: Selecting Mobile Device Management Vendors"

"PC Life Cycle and Mobile Device Management Will Converge by 2012"

Mobile OTA Payment

Analysis By: Sandy Shen

Definition: Over-the-air (OTA) payment usually refers to remote payment as opposed to proximity-based payment. It often uses Short Message Service (SMS), unstructured supplementary service data (USSD), Wireless Application Protocol or downloadable client, but not Near Field Communication.

Gartner defines mobile payment as transactions conducted using a mobile phone and payment instruments that include:

- Bank instruments such as cash, bank account or debit/credit card

- Prepaid accounts such as transport cards, gift cards, PayPal or mobile wallets

Our definition excludes transactions that use:

- Carrier billing using the telco's billing system and the existing prepaid or postpaid mobile phone accounts.

- Telebanking by using the mobile phone to call the service center via an interactive voice response (IVR) system. The exception is IVR used in combination with other mobile channels such as SMS or USSD for enhanced security.

Position and Adoption Speed Justification: Except for the success of mobile money transfer services (a subset of mobile OTA payment) in some developing markets, mobile OTA payment in general has low adoption. In developed markets, people show low interest in the service due to the many payment instruments they already have, and don't see a strong value proposition from mobile payment. In some developing markets market conditions aren't favorable to mobile payment, such as where there are low penetrations of both mobile and banking services, or where the gap between the two isn't big enough to make mobile payment attractive. However, there are some pockets of opportunities for the service:

- **Mobile commerce and app stores driving payments.** Merchants such as Amazon and eBay have deployed mobile sites and applications to drive mobile commerce, and mobile app stores allow users to use credit cards for purchases. This is likely to stimulate OTA payments.

- **Mobile banking integrated bill payment.** Bill payment is often included in mobile banking, and the increasing adoption of mobile banking will make OTA payment available to a wide audience.

- **Money transfer services.** Migrant workers are the first target of the service. Even in the U.S., there is a sizable population of migrant workers that are unbanked.

We also see a new initiative that could potentially be disruptive to card-based payments in developed markets. In May 2011, three U.S. banks announced a service called "clearXchange,"

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which allows anyone with a bank account to send money to another person using the recipient's mobile phone number or email address. This is especially attractive to small or midsize businesses, as they have always been looking for alternative ways to avoid the high fees associated with credit card transactions. Indeed, the new initiative offers much lower fees, and even lower than for PayPal transactions. If this service sees good take up, it will significantly increase the volume of mobile OTA payments in the U.S.

User Advice:

- Banks should use the services that appeal to the local markets to stimulate demand for mobile OTA payment. For example, mobile remittance in developing markets and bill payment in developed markets. They should also monitor the progress of clearXchange, and participate in the service if it does see good take up.

- Mobile carriers should develop services that provide good user experience by taking advantage of the existing payment instruments rather than create something new.

Business Impact: Mobile carriers can expect to see increased revenue and reduced churn from mobile OTA payment. Banks have the potential to reach more users, include them in the mainstream banking infrastructure and then, once they are more familiar with financial products, upsell credit products.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Comviva; Fronde Anywhere; Fundamo; Gemalto; mChek; MoreMagic; Obopay; Sybase; Utiba

Recommended Reading: "Forecast: Mobile Payments, Worldwide, 2008-2015"

"Market Trends: Mobile Payment, Worldwide, 2011"

"Banks Shouldn't Try to Copy the Mobile Payment Success of Kenya and the Philippines"

RFID for Logistics and Transportation

Analysis By: C. Dwight Klappich; Tim Zimmerman; William McNeill

Definition: RFID is the generic term used to identify an automated data collection technology that uses radio frequency waves to transfer data between a reader and a tag to identify, track and locate the tagged item. One of the benefits of RFID is that it does not necessarily require physical sight or contact between the reader and the tag. RFID can be deployed in more than five frequency ranges, which are deployed depending on the business problem being solved. Additionally, the technology has several architectures, including fixed readers directly connected to the network, mobile readers that use cellular or Wi-Fi to communicate, or intelligent tags that talk directly with the cellular or Wi-Fi infrastructures.

There are two basic categories of tags used for logistics and transportation usage scenarios: passive and battery-enabled. Passive RFID, specifically passive ultrahigh frequency (UHF) RFID, is one of the most common forms of RFID because of its use by major manufacturers in the supply chain. Passive tags do not have a battery, Instead, they collect the necessary energy from the antenna of the reader, which can be fixed or portable. Historically, passive tags have been deployed as a license plate, providing only an identification number that pointed to an upstream record within the application. Today, new UHF passive technology is producing tags with up to 8K

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of memory that will allow specific information about the asset to be stored locally. These fairly inexpensive tags still require business process change to provide an ROI to justify the tag cost of $0.05 to $10.00.

Battery-enabled tags fall into two major groupings: battery-assisted passive (BAP) technology and active RFID tag technology. BAP tags maintain many of the characteristics of traditional passive tags and are typically used in the same frequency as passive, but add additional value by being able to collect information about the tagged asset (for example, they can be used to monitor the condition of goods, such as temperature or excessive vibration).

Active RFID tags use an integrated battery to respond to a reader and provide more capabilities, such as identifying individual items or offering basic processing, including GPS location. These tags have historically operated at 433 MHz and 2.4 GHz. The cost of active RFID runs from $5.00 to hundreds of dollars.

Position and Adoption Speed Justification: Numerous RFID applications have been hyped for inventory management. However, RFID and similar sensory technologies are emerging as strong asset management tools, with the ability to collect information about an asset as it moves through the supply chain and provide asset location visibility. Many large carriers and shippers will consider RFID-enabled projects because of the global adoption of electronic manifesting. Standard RFID technologies alone cannot provide long-range geolocating, such as tracking the location of a vehicle miles from its domicile, so look for sensory technologies to intertwine with RFID tags to observe and communicate location and environmental conditions.

One trend in this market is the combination of sensory technologies (for example, RFID/GPS, RFID/onboard computer, RFID/bar codes and RFID/Wi-Fi). Sensor-based combinations will become more viable with the standardization of the interface between the tag and the sensor, which is currently defined as Gen 2 Class 3.

It has been assumed that a network of connected RFID devices/readers will emerge at, for example, ports of entry or across mobile assets, similar to how RFID is used in rail. However, this has not yet materialized beyond early adopters. Where, in rail, assets follow a fixed travel path along the rail, other assets can travel long distances from any type of fixed read point, making building a network more difficult.

Although there have been some large-scale deployments (such as the U.S. Department of Defense [DoD]) that span multiple organizations, these specialized and often expensive initiatives have not been fully commercialized. While the DoD initiative spans organizations, it is an extremely closed-loop system, and today, ROI and success are usually tied to how closed-loop the system is. More narrowly focused offerings that are more commercialized will help improve adoption. For example, tagging and tracking things like high-value assets and security applications — artwork, jewelry, International Traffic in Arms Regulations (ITAR, or export-controlled items) or high-cost subassemblies that include key intellectual property — are potential specialized use cases with reasonable ROI.

Various technologies will coexist, because each technology is suitable to specific process situations. RFID use varies by segment, with asset management (such as tracking returnable assets and transportation) leading adoption. For government initiatives, be prepared for RFID-enabled projects to monitor assets with relatively long use cycles. Toll payment (900 MHz) and contactless cards (13.56 MHz) have been in use for some time, whereas applications in logistics and traffic management are emerging. The increase in processing power and tag memory will provide more applications where RFID will provide business benefits. However, RFID will not replace bar codes or other mobility solutions, such as GPS.

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User Advice: Monitor and be aware of privacy-impact assessments encrypting the data on tags if necessary. Participate in RFID-enabled tracking systems, if only as a pilot project, to gain experience with the different types of tags and frequencies where they are used, as well as to position your company for the widespread adoption of larger, RFID-based system implementations in the future. Start with a closed-loop system (i.e., a system where your company controls most, if not all, of the processes involved), and continue to expand and include additional supply chain partners. Continue to monitor the technology as processing and memory capabilities look to fulfill the vision of RFID tags as a portable database that represents a historical view of specific asset information and transactions. Depending on the end-to-end solution, RFID will require an infrastructure beyond tag/reader, necessitating data storage, network performance, middleware and applications, including analytics, to help optimize use and support governance/control of assets.

Business Impact: Major initiatives that use or propose to use this technology will include tracking of assets, loss prevention, inventory management, rail transportation, logistics, toll payment, traffic management, and transportation asset tracking and control. The impact and business value will vary across industry segments, proposed use or business solutions and regions. Within an enterprise, the value will be derived from the potential, additional benefits of using RFID technologies versus other identification technologies, such as bar coding. In these cases, a cost-benefit analysis should compare the various identification technologies, and RFID should only be chosen if the business case proves it to be the better approach.

The grander yet still elusive vision is the value RFID would offer as part of the extended supply chain and logistics challenge, where it would be used to track, monitor and facilitate the flows of products and modes of transportation across the global supply chain. To achieve RFID's end-to-end vision, standards must emerge that define the requirements that the system components must follow to operate across enterprises and geographies. For example, global supply chains will require a set of common standards to facilitate proper interchanges of information across the entities involved in an international shipment transaction.

As the vision for RFID has evolved away from a replacement for bar codes to places where it could offer unique benefits, the potential exists for RFID to be transformational, as unique and highly valuable solutions emerge. Indeed, not all projects will be transformational, and the value will depend on the RFID use case.

Benefit Rating: Transformational

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: Hi-G-Tek; IBM; Impinj; LXE; Motorola Solutions; Savi Technology; Tego; Xerafy

Recommended Reading: "Securing UHF RFID Passive Tag Communications"

"RFID in the 2009 Supply Chain: Overview and Best Practices for Maximum Investment Value"

"Cool Vendors in Supply Chain Management, 2011"

Mobile Presence

Analysis By: Katja Ruud

Definition: In communications terminology, "presence" indicates real-time user status, availability and context information such as where/how the user may be contacted. Presence originated with

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public PC-based instant messaging (IM) applications, in which it indicates the availability (such as "online," "in a meeting," "do not disturb" and "away") of specific people in a "buddy list." Now, presence is being extended to mobile devices, and includes a wider range of contextual information, such as geographic location, client device capabilities (such as general packet radio service [GPRS], voice, text, Multimedia Messaging Service [MMS] and Java) and device status (such as "switched off" and "on a call"), as well as the user's personal status (such as mood and hobbies).

All presence services require an Internet- or mobile-operator-based presence engine to track and update user presence in real time. There are many proprietary systems with varying degrees of interoperability, and some standardization efforts, such as the Open Mobile Alliance Instant Messaging and Presence Service (OMA IMPS) and the open-source, open-standards Jabber project. Although presence is founded on Jabber protocols and Session Initiation Protocol (SIP), vendors frequently augment these with their own extensions. Some mobile operators have adopted proprietary systems, such as Kodiak Networks and Loopt, but the market is dominated by the original public IM server players, such as MSN, Skype, Yahoo and Google, which are aggressively acquiring presence engines, such as Jaiku. Lately, the earlier set of providers have been joined, and to some extent replaced, by Facebook.

Position and Adoption Speed Justification: Mobile presence continues to be considered an emerging technology and must make much more progress in terms of interoperability to become mainstream. However, initiatives such as the GSMA's Rich Communications Suite (RCS) project are working to address this and, in March 2011, Deutsche Telekom, Orange, Telecom Italia, Telefonica and Vodafone announced their decision to commercially launch RCS across European markets from late 2011. The benefits of mobile presence include boosting communication and collaboration between people regardless of anyone's respective location, both for consumer and business purposes, and driven by the extension of social networks to the mobile device, the expected adoption of unified communication coupled with a continued use of smartphones and other more capable consumer devices, which increasingly include context capabilities, such as GPS.

For the enterprise segment there is the additional boost to come from growth in communications-enabled business processes and, to some extent, fixed-mobile converged services where presence extended to the mobile device will contribute to enhanced performance. For this customer segment, mobile presence will likely become part of a more comprehensive mobile unified communication strategy where there are benefits beyond presence itself, such as fixed-mobile replacement and the consequential reduced cost base.

User Advice: While current progress looks predominantly consumer-driven, mobile presence offers many benefits to the enterprise in accelerating communication and collaboration between employees, suppliers and customers, and communications-enabled business process and collaboration software will increasingly become "context-aware." Therefore, enterprises revising their voice strategy, which now is extended to a unified communication strategy, need to start planning to what extent, and when, context awareness should be built into their enterprise architecture, infrastructure and possibly also service provider decisions. Enterprises should also continue to follow behavioral trends in the consumer segment to assess validity and applicability in the business segment.

CSPs can position presence technology as a tool to improve the effectiveness of business communications and as a key component of unified communications services and business-enabled processes. They may also be able to improve customer "stickiness" by promoting presence as a consumer service for mobile communities and mobile IM services. However, because of users' desire to be in touch with their community (no matter what phone or which operator they use), the need for operator independence, interoperability and integration with

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popular sites will favor the large Internet-based players and limit the appeal of operator-specific solutions. The scope of presence can also be broadened by adding location attributes, which will accelerate consumers' ability to communicate while also benefiting businesses, which can make use of location-based searches, for example.

Business Impact: In the enterprise, presence information has the potential to significantly add value to business-to-employee and business-to-customer context-aware applications and communications-enabled business processes. Additionally, it will be essential for the most productive use of unified communications. In consumer markets, presence is at the heart of IM, and is now being extended to Internet-enabled online communities and social networking software, such as Facebook. While the benefits in enterprise and consumer markets will be moderate to high, issues of confidentiality, personal control and privacy must be carefully addressed.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: BlackBerry; Ericsson; Google; Kodiak Networks; Loopt; Nokia; Whirl

Recommended Reading: "Market Trends, Top 10 Consumer Macro-Trends, Worldwide, 2010-2020"

Enterprise Mobile Communications Gateway

Analysis By: Phillip Redman

Definition: An enterprise mobile communications gateway (EMCG) is a server that is integrated into the corporate telephony system to support mobile phones. It can support both single-mode (cellular) and dual-mode (cellular/Wi-Fi) network capabilities. As more organizations clamor for greater control over the myriad telephony options, combined with their need to prepare for unified communications (UC) and unified communications and collaboration (UCC), IT organizations will need to employ mechanisms that extend enterprise telephony functionality to users connected via mobile phones and support mobile UC (mUC) and fixed-mobile convergence (FMC) capabilities. This can be accomplished through EMCGs that focus on mobilizing UC, typically by integration with the fixed voice system in the enterprise, and can be used on most mobile smartphones and from most locations (home, office, etc.). This can be provided as either an on-premises or a hosted capability, and works best for enterprises with multiple voice systems. Vendors in this space generally arise from an enterprise telecommunications background, while others are mobility specialists and generally vendor-neutral (meaning that they're not tied to one vendor's products for mobile devices, telephony infrastructures or Wi-Fi access points, for example). EMCG is the technology to support both mUC and FMC.

Position and Adoption Speed Justification: Interest and adoption continue to increase in this market, but it remains an emerging capability with some vendor consolidation in both M&As and bankruptcies. Vendors continue to launch and evolve their products, with video being a main feature enhancement for 2011; however, many of these features are being built into UCC suites. Thus, the need for a separate mobile gateway is disappearing. The major PBX vendors are moving to integrate much of the EMCG functionality onto their PBX and UC platforms, and Gartner expects this to be standard in the next two to three years. Gartner expects that a specific EMCG platform will be needed less as this integration continues, and as enterprises further consolidate and standardize on IP-PBX platforms. Communication service providers are also moving to enter this market, and offer this capability as a managed or hosted service.

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User Advice: Companies with a large number of mobile users should look to incorporate EMCGs as they evolve toward IP telephony — either as a separate function, or as part of a next-generation IP voice system. Today, all smartphones can support integration into the fixed voice system, and users are already moving much of their voice traffic to mobile phones. Companies that have a greater need for international toll calling or roaming will find some savings here. Companies that need better in-building coverage should assess dual-mode solutions that support VoIP over WLAN.

Business Impact: Changes in enterprise voice migration continue, including the continued displacement of wireline with wireless services. With the rapid adoption of smartphones, many users are already performing advanced functions — outside their enterprise telephony systems. EMCG integrates mobile phones into the corporate telephony system. Mobile phones have provided a mobile alternative for basic voice functions. Giving the user two different systems still creates problems with the different features, multiple phone numbers, multiple voice mails and, in some cases, multiple email identities. The goal of convergence and using EMCGs is to bring these two worlds together for mobility and usage reasons ahead of cost reasons. Companies can see the soft benefits of greater efficiency and connectivity, as well as greater in-building wireless coverage for those using dual-mode Wi-Fi systems. Hard benefits (cost savings) based on least-cost routing, elimination of desktop hardware and reduction of traffic (and the service expenses associated with it) can be achieved; however, technology investments may offset any real gains.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: ShoreTel; Tango Networks; Telepo; TeleWare; Varaha Systems

Recommended Reading: "MarketScope for Enterprise Mobile Communications Gateway"

Mobile Data Protection

Analysis By: John Girard; Eric Ouellet

Definition: Mobile data protection (MDP) begins with software- and/or hardware-based encryption of stored enterprise data in files, folders, partitions and drives on mobile systems, including notebooks, smartphones and tablets. In this definition, mobile data is not "data in transit" over a network. Instead, it extends to setting and enforcing rules for fixed and removable media used in mobile contexts. Systems may be company-owned or supplied by an employee or contractor. Most vendors in this market target mobile workstations (notebooks) running a full OS, such as Windows 7 or Mac OS X, and the majority of profits come from solutions for Windows-based notebook computers. The same products may also be used on desktops and servers. Gartner has considered MDP for smaller mobile devices to be a visionary aspect of the MDP market assessment.

Position and Adoption Speed Justification: MDP tools — software and hardware that encrypt information on fixed and removable storage devices, ranging from hard drives to flash drives — continue to sell well enough to support more than a dozen discernible vendors. Public outcry of loss of data on notebook computers, as well as civil and government actions against companies over high-profile data leakage debacles, ensures that this product category will continue to gather strength. Products range from suites that can protect a wide range of platforms to single-purpose solutions, with the bulk of revenue deriving from notebook (laptop) computers running Windows XP and Windows 7.

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Factors that should have accelerated the MDP market toward maturity within five years failed to transform deployment and adoption in the last year. For example in the workstation side of the market, high-performance, self-encrypting drives based on the Trusted Computing Group (TCG) specifications (including TCG Opal) are still in limited supply. Microsoft continues to promote BitLocker, which should be an easy choice for many, but many users are waiting for improvements in manageability, cross-platform support and key protection, and may reconsider later in 2011 after the release Microsoft BitLocker Administration and Monitoring (MBAM). Enterprises are willing to invest in management and security on smaller devices, but many of the pure-play MDP vendors and some of the larger endpoint protection platform (EPP) vendors had counted on a future for Windows Mobile 6.x, and have not kept pace with the explosive growth of consumer smartphones and tablets. It is likely that the pure-play MDP vendor community will not be able to competitively address the smartphone/tablet markets because companies are resistant to piling dedicated solutions onto small devices, particularly ones that will be owned by the users. Furthermore, each mobile OS platform will eventually offer sufficient embedded encryption to minimize the role of protection to mobile policy management. Security management is already being absorbed by the fast-growing mobile data management (MDM) players, which significantly outnumber MDP vendors.

Administrators and users are still disappointed with the product complexity and usability involved in MDP, but the complaints are most relevant to retroactive installs for legacy systems that sometimes suffer from lack of disk space, slower processors and insufficient RAM. Fresh installs on new systems are more successful, especially if the installation team has prior experience with MDP.

Further progress toward the Plateau of Productivity requires evidence that MDP is becoming a standard aspect of and routine function in all device configurations. Gartner receives a steady stream of inquiries about MDP, but clients continue to leave large portions of workstations without protection, or they are only partially invested with MDP, based on a naive belief that they can identify the few systems that contain highly sensitive data. Patchy and incomplete support for encryption and access controls on smartphones and tablets makes progress even more difficult, reducing the apparent progress toward uniform data protection practices. And, notifications of breaches continue to be reported. It is important to note that tablets are additive to the IT data protection burden, not replacing notebooks in the near term.

User Advice: The loss or theft of data on mobile devices is among the largest and most publicly damaging data exposure risk companies face. Therefore, data protection is one of the first investments that should be made on a mobile platform. It is wise to include data protection in the plan for the standard image, administration and maintenance for all devices — whether mobile, and whether large or small. Products should be thoroughly trialed before adoption. Look for lean products with good performance and the ability to take advantage of embedded hardware (if present).

Business Impact: The business value for data protection can seem low because encryption doesn't contribute directly to productivity. However, the number of laws coming into play and the increasingly severe penalties help to raise business awareness of the value of data protection in terms of avoiding the costs of embarrassment, lost intellectual property and other critical corporate data, lost business deals and reputation, and legal and civil penalties. Gartner quantified a cost scenario (see "Pay for Mobile Data Encryption Upfront, or Pay More Later"), which demonstrates that even simple breaches can cost many times more than the investment to protect data properly.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

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Maturity: Mature mainstream

Sample Vendors: Becrypt; Check Point Software Technologies; Credant Technologies; McAfee; Microsoft; Novell; Safend; SafeNet; Secude; Sophos; Sybase; Symantec; Trend Micro; Trustwave; Verdasys; Wave Systems; WinMagic

Recommended Reading: "Magic Quadrant for Mobile Data Protection"

"A Buyer's Guide to Secure USB Flash Drives"

"Magic Quadrant for Mobile Device Management Software"

"Trusted Computing Group Specifications Will Simplify Hard-Drive Encryption"

"Pay for Mobile Data Encryption Upfront, or Pay More Later"

"How to Avoid Mobile Data Protection Failures"

"Implementation Advice for Mobile Data Protection"

Mobile Advertising

Analysis By: Andrew Frank

Definition: Mobile advertising is advertising or other paid placement on mobile device screens. This category was formerly limited to handset-based screens; however, with the introduction of media tablets — most notably Apple's iPad — it has been expanded to include these screens as well.

- Mobile advertising encompasses a number of formats:

- Mobile Web banners and display ads (including rich media)

- Mobile in-application ads

- Mobile search and map-based ads

- Mobile in-stream video and audio ads

- Mobile display ads affixed to SMS or Multimedia Messaging Service (MMS) messages

Mobile ads may be acquired through ad networks, directly from mobile publishers or mobile app developers, or from mobile communications service providers (CSPs) or manufacturers that provide portals on certain devices.

Since smartphones and media tablets are increasingly used to access Web content (much of which is not yet optimized for display on these devices), as well as broadcast content (TV and radio), the status of advertising within these cross-platform content formats becomes ambiguous. To reduce ambiguity, we consider mobile advertising to apply only to formats that are specifically optimized for wireless Internet delivery to a mobile device.

Position and Adoption Speed Justification: Aided by a notable recovery in ad spending overall, the mobile advertising category has accelerated its evolution over the past year, and, despite lingering issues, such as privacy, metrics, standards and so forth, Gartner expects the mobile advertising market to more than double over the next two years and to increase 12-fold by 2015 to $20.6 billion worldwide, or about 4% of total ad expenditures. This growth is being driven by robust consumer adoption of smartphones and media tablets, which is changing the way consumers use and think about mobile devices — from primarily as phones to all-purpose

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information, entertainment and social networking devices. Gartner forecasts nearly 1 billion smartphones and about 350 million media tablets will be sold in 2015, making these platforms nearly indispensable for advertisers.

The growth of mobile advertising is also being streamlined by the many lessons learned through the 10-year emergence of Internet advertising, as many of the business models and practices, such as ad networks and exchanges, automation platforms, and context-aware interactive design techniques, are replicated and refined for the mobile channel.

Along with mobile adoption of Web advertising concepts, advertisers and content providers are discovering the utility of using a mobile device in concert with other media, including television, radio, print and out-of-home signage. The key to these applications is the use of microphones and cameras as input devices that can recognize audio and visual cues, such as audio fingerprints and watermarks (to synchronize with TV and radio) or quick response (QR) codes and image recognition (to extend messaging from print ads and signage).

In addition to microphones and cameras, other device sensors, such as GPS, a compass and an accelerometer, can provide targeting input that advertising platforms can use to optimize selection and presentation of ads based on location and other contextual factors.

Add to these benefits projected growth in mobile payments (forecast by Gartner to have almost 350 million users worldwide in 2015) and mobile becomes an even more attractive promotional and transactional platform for advertisers, especially in retail sectors and other businesses that rely on direct response marketing, such as publishing and financial services.

Despite these positive signs, significant challenges do remain. For example:

- Formats and standards. Existing ad standards from organizations such as the Mobile Marketing Association (MMA) and the Interactive Advertising Bureau (IAB) are widely considered to trail the capabilities of more-advanced smartphones and media tablets, leading to the emergence of nonstandard device-specific platforms, such as Apple iAds, that have high creative potential but are expensive and limited in terms of reach and expertise.

- Metrics and measurement. The mobile metrics picture, considered by many advertisers and agencies to be a baseline requirement for any major media investment, remains uncertified and hampered by technical complexity.

- Privacy and targeting. The issue of privacy norms and regulations, especially for potentially attractive but controversial location-based concepts, has also created controversy and reluctance, particularly on the part of CSPs to use phone-based customer data for ad targeting. Meanwhile, many of the targeting methods developed for the Web, such as the use of third-party browser cookies, are widely unavailable on the mobile Web because of such factors as the default settings of Apple's mobile Safari browser, which are set to reject third-party cookies.

In summary, growth is likely to accelerate in the coming years, although many fundamental issues remain to be resolved.

User Advice:

- Brands and agencies must develop methods of evaluating the effectiveness of mobile campaigns across various mobile channels to optimize the use of mobile media in the marketing mix. This is likely to vary considerably by product category, audience profile and region. In particular, brands and agencies must consider ways to use mobile

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channels as a response mechanism in concert with other noninteractive formats, such as print and TV, and not just as a stand-alone channel.

- Local advertisers, in particular, must understand how to leverage the medium's ability to deliver nearby traffic to their offline stores and venues in a privacy-friendly way.

- Advertisers and agencies must also revise privacy policies to address new and potentially controversial targeting capabilities of mobile devices and systematically assess regional variations and partner practices.

- Content providers, developers and publishers need to understand how to incorporate elements such as social features, maps and video into applications that will attract both users and advertisers.

- CSPs and manufacturers need to be decisive about their intended roles in mobile advertising and acknowledge that, with few exceptions, success will require both strong partnerships and strategic acquisitions to quickly establish key roles in end-to-end solutions that can deliver efficiency and scale to advertisers.

- CSPs and advertisers should not overlook handset telephony capabilities for contextual click-to-call and save-contact features in ads.

- For developing markets, SMS will remain a good way to distribute marketing messages to mass audiences, and it may provide enough economic value to subsidize the expansion of access to more-advanced handsets and service plans.

Business Impact: Mobile advertising will siphon most of its revenue from print and outdoor categories, although it will be complementary and often used in concert with those categories, making them more efficient through direct response and thus raising their value to advertisers, which will limit its impact on these media by preventing overall spending from being a zero-sum game. Mobile's impact on television will be minimal, although the overall effect of mobile will be to emphasize direct, targeted, pull-style interactions that may accompany a long-term reduction in the share of marketing resources directed at general media advertising.

The question of how mobile advertising will affect growth in Web advertising highlights the issue of categories. Mobile Web will be increasingly difficult to separate from PC-based Web delivery as more content is designed to adapt to different format factors, and competition will center more on Web ads versus in-app ads on these emerging platforms. In this competition, we see in-app display taking an early lead because of the industry-leading efforts of Apple, although we expect Web display to ultimately prevail as HTML5 comes of age and delivers advertisers a uniform standard that eliminates the overhead and reach limitations of platform-specific development.

On the opportunity side, mobile advertising seems to be conveying most of its impact on Web leaders, such as Google and Apple, which have successfully exploited the channel, along with a number of mobile ad networks and platform providers whose timing coincided with the long-anticipated growth in the channel. Publishers, content providers and application developers appear to have a similar problem on mobile that has challenged their efforts online, namely the "long tail" fragmentation of audiences and usage that makes it difficult for all but a few providers to achieve the scale necessary to attract substantial ad revenue. A few CSPs have succeeded in building momentum around mobile advertising efforts, although the majority find themselves marginalized by reliance on their flagging portals. Manufacturers other than Apple have also found difficulty gaining a foothold in the ad platform market.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

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Maturity: Adolescent

Sample Vendors: Apple; Google; Greystripe; Jumptap; Microsoft; Millennial Media; Velti; Yahoo

Recommended Reading: "Forecast: Mobile Advertising, Worldwide, 2008-2015"

Mobile Browsers

Analysis By: Michael J. King; Hugues J. De La Vergne

Definition: The mobile browser is an on-device, client-side application that is resident on a mobile device. It provides access to content and applications from the Internet and, increasingly, in the cloud. Desktop and mobile browsers share many functions; however, increasingly, there are also differences, including the size of the screen, the power of the device (both processor and memory footprint), the speed of the network and the resources on the device. The browser for a mobile device has been considered a lower-functioning device than the browsers found on the desktop; as HTML5 and webkit-capable browsers find their way onto mobile devices, this is positioned to shift.

Position and Adoption Speed Justification: Although browsers on mobile phones, in general, are relatively mature, the technology has been poorly adopted, because of the user experience it delivered. This has been exacerbated by inconsistent implementation of browser standards by the big smartphone vendors, which is also the reason this technology has moved backward on the Hype Cycle. During the next three years — with the adoption of HTML5 by many of the browsers and the standardization of resource (e.g., location, camera and accelerometer) access on smartphones — the adoption of mobile browsers for application access and content delivery will increase dramatically. (HTML5 enables significant offline caching of information for application functionality without a network connection, among other things.) The separation between the capabilities of the HTML5 browsers shipped on the devices and the standardization of interfaces, in terms of timing and delivery, will be a gating factor for cross-platform requirements.

Three categories of mobile browsers are supported across a variety of devices:

- Fully functional, HTML5-compliant, webkit-capable browsers — these are often found on smartphones and devices with OSs, such as RIM, Apple and Android. Most tablets support these types of browsers as well, although we envision most of them moving to desktop-derived browsers during the next two to three years.

- Middle-function browsers, with HTML and graphics support, but limited support for advanced feature sets or access to resources on the device — these are found on older versions of RIM OSs, Symbian devices and third-party support.

- Wireless Application Protocol and limited-function, text-based browsers — these are often found on feature phones.

The highly variable target for content and Web developers means that fewer than 20% of mobile applications developed are thin-client (or browser-based). With the adoption of HTML5 and the capabilities it provides, Gartner sees that percentage moving toward 40% to 50% during the next three years, particularly for informational or forms-based applications.

User Advice: Enterprises should experiment with thin-client (browser-delivered) application design and content delivery for their end users and customers. Although standardized HTML5 implementations in the context of a mobile browser are likely to be three to five years out, the security and information delivery capabilities of mobile browsers may be an appropriate fit for a growing number of mobile application initiatives.

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Business Impact: The impact of the browser is threefold:

- For mobile device and platform vendors, the browser experience is a way to differentiate their products and entice a wider range of content owners to enable access via the mobile device.

- For content owners and application developers, the browser offers a secure, and increasingly rich, way to deliver a wide range of content types, and is another architecture to consider for that delivery.

- For enterprises, the mobilization of information will enable employees to depend less on device types and requirements of those individual platforms.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Sample Vendors: Apple; Google; Nokia; Openwave Systems; Opera; Research In Motion

Climbing the Slope

Mobile Sales Force Automation for Call Reporting/Dashboards

Analysis By: William Clark; Michael Dunne

Definition: This technology involves the use of wireless and mobile technology — such as PDAs, smartphones, media tablets or tablet PCs — to record client calls and outcomes. Gartner sees this in retail sales, high-tech manufacturing sales, pharmaceutical sales and in some consumer packaged goods sales. In hybrid field service/sales roles, this technology is used to meet SLAs, and to follow up with prospects and customers on sales or service issues. It includes summary reports and dashboards available on devices used by sales management and executives for key customers, projects or initiatives.

Position and Adoption Speed Justification: Although it remains a lower priority than other wireless initiatives that use sales force automation (SFA) technology, improvements in smartphones, mobile browsers and particularly media tablets are facilitating mobile SFA for call reporting and dashboards, because mobile workers can input call reports on smaller mobile devices (such as phones), and managers can read summaries of those call reports on their mobile phones. Mobile SFA, in general, is picking up, and there is a related positive effect in interest for dashboards and call recording, especially in cases where media tablets can provide an improved ability for scrolling.

This technology has experienced difficulties with integration and display, as well as with its ability to act on rolled-up information on dashboards. However, media tablet adoption is having a very positive effect; client inquiries were up significantly in the past year. Mobile SFA for call reporting/dashboards is most effective in mature sales organizations and cultures.

User Advice: Consider this technology, especially in complex selling environments. Avoid overinvestment or underinvestment by examining use cases, the willingness of salespeople to use this function and the difference call reporting can make to business outcomes. For example, overinvestment could be spending a great deal to ensure that the data being collected can be acted on rapidly. With the accessibility of wireless on mobile devices, managers might require more instantaneous input of call reporting data. As the requirements intensify, the user, employing an already difficult device, might make more mistakes. The more instantaneous the

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information, the more it might interfere with the selling process. Enterprises must assess clear lines of delineation, where input of more and more information in shorter time frames actually turns counterproductive.

Enterprises should construct these systems with built-in context and preloaded information to keep input requirements to a minimum. They should also set a maximum character input limit, so that zealous management doesn't destroy sales incentives by burdening them with heavy administrative tasks. Consider the maturity of organizational sales force processes, the value of improved accuracy and the ability to act on information.

Most enterprises should begin with general collaboration, then look for specialists to customize and integrate this technology into their CRM systems.

Business Impact: Overall, the impact of mobile SFA in the call reporting/dashboard market is moderate (the impact tends to be higher if analytics is targeted at tablet PCs or notebooks). It's important for implementing customer-intimacy strategies with customer-facing personnel, as well as increasing individual productivity in recording sales activities and outcomes by providing greater flexibility in inputting data via mobile devices. In addition, this technology has the potential to facilitate improved data collection and visibility into events in sales cycles and among accounts for the benefit of management oversight.

Mobile SFA for call reporting/dashboards contributes to personal productivity. For example, it supports entering observations/outcomes immediately after a sales call, which improves recollection and creates better historical data. In addition, it improves "corporate agility" — management can see information and be more rapidly alerted to events in the sales cycle.

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

Sample Vendors: Acumen Solutions; Antenna; MeLLmo; Pyxis Mobile

Recommended Reading: "Mobile Sales Force Automation: Architecture, Support and Technology Choices Can Cut Costs 12%"

"Selecting the Right Smartphone Platform for Sales Force Automation"

"Evaluating SFA Functionality for Smartphones"

VoIP Over WLAN

Analysis By: Sandy Shen

Definition: This technology enables voice over Internet Protocol (VoIP) calls to be made over wireless LANs (WLANs).

Position and Adoption Speed Justification: Consumers can install VoIP clients, such as Skype, Truphone and fring, to make calls over WLAN — mostly to avoid long-distance charges. Enterprises that have designed their WLAN infrastructure to support voice over WLAN (VoWLAN) requirements, can seamlessly transfer calls from mobile networks to gateways that use the enterprise PBX. Wi-Fi provides higher bandwidth and lower latency, and so better quality of service (QoS) than over mobile connections.

Adoption of VoWLAN services is helped by the increasing penetration of Wi-Fi-capable phones and VoIP clients dedicated to the phone. As a result of competitive pressure and customer

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demand, it also has support from mobile carriers that have, in the past, resisted VoIP calls. Some mobile carriers are routing the voice traffic over circuit-switched channels before routing it to the IP infrastructure. This can ensure better QoS than Wi-Fi or the packet-switched services of the mobile network, and can also fill the coverage gap for indoor and underground. Some carriers, such as KT, have used WiMAX instead of Wi-Fi to offer campuswide voice calls, though we don't expect WiMAX to be deployed on a large scale.

We don't expect VoWLAN to present an immediate threat to mobile carriers' voice revenue in the short term, because large voice bundles have driven down the costs per minute for local and domestic calls and VoIP is mostly used for international and roaming calls. On the other hand, this technology may help to improve the user experience as the QoS over WLAN is better than over cellular, and can generate revenue from enterprises.

User Advice: Mobile carriers should explore the benefits of integrating popular VoIP clients into Wi-Fi-capable phones, as a way to attract and retain users. They can also consider routing a certified VoIP providers' traffic over circuit-switched channels to provide good QoS. Additionally, they should continue to develop alliances that facilitate seamless enterprise phone support, and make available as many Wi-Fi hot spots as possible — so that users can easily choose WLAN over mobile for VoIP calls.

VoIP providers should develop clients for popular smartphone OSs, provide a good user experience by integrating access to multiple popular VoIP services, and work with carriers and device vendors in distributing their services.

Business Impact: VoWLAN services will have a limited downside impact on mobile carriers' revenue in the short term, given the inexpensive cost per minute for local voice calls. There is potential for an upside, if carriers skillfully promote the VoIP service to attract and retain users — especially those high average revenue per unit users who tend to take up more international and roaming services.

Benefit Rating: Low

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Apple; fring; Kineto Wireless; Motorola; Nokia; Skype; Truphone

Mobile Social Networks

Analysis By: Monica Basso; Brian Blau

Definition: Mobile social-networking services enable individuals to connect to their social communities with a mobile device, through one or more available mobile channels. Members share experiences, interests, opinions, presence information and personal content through their mobile devices. Mobile adds new capabilities to social networking, such as location-related services (e.g., check-in) and new visualization mechanisms (e.g., augmented reality showing where friends are).

Position and Adoption Speed Justification: Many startup companies around the world have launched social-networking services for mobile users. The business opportunity is to address today's 4 billion (and growing) mobile phone users worldwide with dedicated services that leverage location and more-general contextual information. Mobile devices, such as enhanced phones, feature phones, smartphones and tablets, are the predominant tools used by people to stay in touch with members of their real communities.

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A range of providers that focus on mobile channels is emerging. For example:

- Mobile pure-players, such as GyPSii, MocoSpace, Foursquare, Gowalla, are "check-in" companies that defined the beginning of the mobile social revolution. Foursquare is now bigger than most of the mobile social networks listed here, and because it came out with some disruptive products/technology, it forced companies like Facebook and Twitter to roll out check-in services of their own. Color and Pixamix are a new breed of mobile social networks that automatically connect people based on location, interest and history, and it's all done through photographs.

- Mobile players federated with Web-based social networks (such as Facebook) include myGamma, Mobimii, Bluepulse, Funambol, Mobikade and Crush or Flush. They offer some blend of services in this area.

- Carrier players: Some providers partner with mobile carriers to give access to their mobile communities to the carrier's subscribers through a link on the default page of mobile phone browsers (for example, Jumbuck Entertainment and airG).

- Leading social networks: Facebook, Twitter and Bebo, as well as other community-oriented services, such as YouTube, Flickr, LinkedIn and Plaxo, are accessible through optimized clients for most mobile platforms.

- Megaplayers in the Internet and mobile industry have launched different initiatives to enable social-networking experiences on mobile devices. For example, Google bought Jaiku and Zingku, although it does not yet have a clear social networking strategy; Yahoo offers oneConnect; and Nokia offers Ovi (to be rebranded "Nokia Services" later in 2011), with further integration expected with Microsoft's online services (e.g., Bing) after the partnership announced in February 2011. Apple has integrated communities in iTunes (Ping, a social music network) and Game Center (Apple's game network), accessible on iPhones and iPads.

Such a crowded market will go through consolidation during the next 18 months. Startup companies will fight to gain brand recognition and grow subscribers (perhaps through partnerships with bigger players), mostly on a regional or local basis. Some will be acquired by larger companies, such as Internet portals, handset manufacturers and carriers. Through 2015, the pure-play, mobile social-networking market will consolidate around five players or less. Social-networking companies will target a multichannel audience with context-oriented services. Internet companies will consolidate multichannel social-networking services.

According to Gartner surveys, 15% of mobile phone users are currently accessing social-networking sites on the phone. Today's biggest social network, Facebook, claims that more than 40% of its 700 million active users currently access services through their mobile devices. Adoption is expected to grow rapidly among mobile users. By 2014, mobile social-network users will reach 1 billion.

User Advice: Organizations should explore mobile social networks to find opportunities for innovating their communication styles with employees, clients, partners and markets (for example, to enable salespeople to collect and share geolocated information about customers in real time). MSN also represents great opportunities to engage with end customers and establish new forms of marketing and advertisement. However, organizations need to evaluate emerging risks in the areas of IT security threats, legal liabilities and reputation.

Business Impact: Mobile social networking is likely to affect many vertical sectors, particularly where organizations deal with large client or user communities (such as the retail, education,

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healthcare and government sectors), or have larger distributed workforces in sales or other client-facing activities (such as the pharmaceutical, transportation and utility sectors).

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: bliin; Facebook; Funambol; GyPSii; MocoSpace; Myspace; Twitter; Yammer; Zyb

Recommended Reading: "The Emerging Market of Mobile Social Networks Offers New Business Opportunities"

"Social Trends Are Influencing the Adoption of Mobile and Web Technology"

"Gartner's Top Predictions for IT Organizations and Users, 2010 and Beyond: A New Balance"

"SWOT: Facebook, Worldwide"

"SWOT: Twitter, Worldwide"

"Market Insight: How Consumers Socialize On the Go, The Rise of Portable Social Networks"

Mobile Application Stores

Analysis By: Monica Basso

Definition: Application stores offer downloadable applications to mobile users via a storefront that is either embedded in the device or found on the Web. Application categories in public application stores include games, travel, productivity, entertainment, books, utilities, education, travel and search, and can be free or charged-for. Private application stores can be created by enterprises for mobile workers.

Position and Adoption Speed Justification: Mobile application stores are targeted to smartphone and media tablet users, for a range of applications that include entertainment, utilities, social networks, music, productivity, travel and news.

One of the original application stores was offered by GetJar, which is still in the market today. In 2008, Apple introduced App Store, with free, advertisement-based or charged-for applications. App Store generated huge interest and adoption by its device customers, and has been a main differentiator for iPhone and iPad success. In January 2011, Apple announced the achievement of over 350,000 apps and 10 billion downloads. Apple paid out over $1.5 billion in revenue sharing to developers in 2010. App Store generated excitement in the market and forced other handset and OS manufacturers to try reproducing similar dynamics and introduce their own application stores — for example, Google Android Market, Nokia Ovi Store (now rebranded Nokia Store), Research In Motion BlackBerry App World, Microsoft Windows Marketplace for Mobile and Palm Software Store. Microsoft and Nokia will pursue synergies among the two stores, as part of a major partnership that brings Windows Phone 7 on Nokia devices. Carriers are also offering upgrades to their own application stores and offerings for their feature phones, with a view to exposing services such as billing, location and messaging to developers — e.g., Orange App Shop and Vodafone 360. A number of third parties, such as Handmark, GetJar and Qualcomm, offer white-label solutions to carriers. An increasing number of enterprise portals promote applications that employees should, or are recommended to, download through either passthrough to the store or local download.

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Public application stores are relevant to enterprises for two reasons: (1) consumerization and personal device models are bringing progressive usage to employees; and (2) mobile business-to-consumer (B2C) application initiatives to target end customers can leverage application stores as channels for application distribution and discovery by target users.

Among enterprise-specific application stores, Citrix Dazzle works across a range of client and mobile devices, and provides a mobile app store for internal deployment (i.e., the enterprise runs the store). Other vendors, such as MobileIron and Zenprise, enable private application stores.

Due to the expectation that the adoption of smartphones and high-end feature phones will increase, along with the popularity of applications, we expect application stores to accelerate rapidly to the Plateau of Productivity in less than two years.

User Advice: Enterprises should evaluate opportunities that originate from application stores to target end customers with mobile applications (e.g., to engage them in community-based activities to implement market campaigns, collect customer feedback and preferences, and provide new services).

Application providers and developers should look for application stores that are associated with popular handsets and that can create a good user experience, and should weigh that against the difficulty of developing and porting applications and the potential popularity of an application. It is also important to choose application stores that have good distribution in terms of outlets and service from the application development community. Other features of application stores that would benefit developers include advertisement support (like the Google model, to allow vendors to be "top of deck"), user reviews, rankings and recommendations (as with Amazon), and good billing and reporting features.

Application stores are a "scale game," and those offering them need to create some unique selling points that will bring developers to their stores, rather than those of their competitors. An "ecosystem" needs to be created in which developers have the tools to easily write and port applications; individuals can easily access, download and use applications; and all sides have visibility into the accounting of application sales and an efficient billing system that allows everyone to get paid in a timely manner.

Business Impact: Mobile application stores are likely to have an impact on:

- Brands, which can advertise and segment customers based on applications

- Application providers, giving them access to additional customers in a well-organized ecosystem

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Apple; Google; Microsoft; Nokia; O2; Orange; Palm; Research In Motion; Vodafone

Recommended Reading: "Marketing Essentials: How to Decide Whether to Start a Mobile Application Store"

"Dataquest Insight: Application Stores; The Revenue Opportunity Beyond the Hype"

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Mobile Service-Level Management Software

Analysis By: Monica Basso

Definition: Mobile service-level management enables enterprises to increase the resilience of their mobility deployments and provide appropriate service levels for mobile users, while implementing more cost-effective operations. Wireless email is the area with the highest demand, because email is a mission-critical application, and users do not tolerate service faults and outages. These capabilities are increasingly provided as part of mobile device management product suites or cloud services.

Position and Adoption Speed Justification: Organizations with midsize to large wireless deployments face the challenges of service resilience and business continuity. Scaling up deployments while maintaining the appropriate service quality and performance is an additional challenge. Software products, such as those sold by BoxTone and Zenprise, support a range of techniques to deal with these challenges, including:

- Mobile-user real-time monitoring and management

- Mobile-user self-service

- Troubleshooting

- Capacity management/load balancing

- High availability

- Disaster recovery

- Failover/failback

The growing size and complexity of mobility deployments force organizations to acquire appropriate management capabilities. As operational costs represent about 60% of mobility costs, IT organizations will increasingly invest to acquire tools for containing these costs. Organizations begin to invest in tools for optimizing wireless email and application deployments, increasing service resilience and quality for IT users more cost-effectively.

We expect demand to grow significantly for tools that support better service levels to users, such as real-time monitoring, user self-service and support, and cost optimization tools, as well as for techniques and tools implementing data center disciplines, such as high availability, fault tolerance, disaster recovery, load balancing and capacity management.

Some wireless email platforms already offer some of these capabilities natively. Research In Motion's (RIM's) BlackBerry Enterprise Server offers some monitoring, reporting, alerting and troubleshooting capabilities, as well as high availability. Microsoft Exchange offers high availability as well. However, some wireless email platforms are limited, because they tend to focus on single nodes or capabilities instead of taking a holistic approach (for example, in the BlackBerry support, there is no help to deal with network operations center [NOC] failures and consequent service outages).

Mobile service-level management capabilities are complementary to those in mobile device management and telecom expense management tools. Many vendors have expanded their product suites to cover also these complementary areas that are critical for enterprises dealing with consumerization — driving further adoption of service-level management capabilities, too. This justifies the rapid change in adoption that moved from the post-peak position in 2010 to the post-trough position in 2011.

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We expect consolidation among these vendors. More competition will come from vendors in related markets, such as enterprise wireless email platforms (for example, RIM), IT outsourcing services (for example, HP, IBM and CSC) and mobile operators active in enterprise markets. Mobile device management and PC management life cycle vendors (for example, Microsoft, Sybase, LANDesk, BigFix, HP and Capricode) may also expand in this area, possibly through acquisition.

User Advice: IT organizations investing in mobility, particularly wireless email, should evaluate service levels required by mobile users, identify potential factors of risk to interrupt or downgrade those services, choose mobile service-level management tools that allow them to cope with the risk and minimize the impact of rapid scaling deployments, faults and outages on end users.

Business Impact: This technology can be used to improve user support (for example, through self-service portals or by troubleshooting problems rapidly), to control costs and to optimize usage of server resources in the data center.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

Sample Vendors: BoxTone; Conceivium Business Solutions; Devinto; Good Technology; InterNoded; MobileIron; Neverfail Group; Zenprise

Recommended Reading: "Magic Quadrant for Mobile Device Management Software"

"The Five Phases of the Mobile Device Management Life Cycle"

"Cool Vendors in IT Operations Management, 2007"

"Latest RIM Outage Shows That Customers Need a Backup Plan"

Mobile Enterprise Applications via SaaS

Analysis By: William Clark

Definition: On-demand mobile enterprise applications (MEAPs) are hosted outside the enterprise firewall in a multitenant or traditional hosting fashion. These applications are internal and employee-facing, can be native or browser-based, and are deployed to mobile devices to connect employees to enterprise information while outside the office or while mobile within a corporate facility or campus. They enable organizations to purchase stand-alone or incremental mobile solutions as services. These offerings can be hosted by a software vendor or a service provider (large enterprises in Gartner's sample deploy between 200 and 1,500 seats). Examples include point solution vendors focused on location-based services, niche vendors offering time and/or expense tracking, MEAPs, such as Spring Wireless or Antenna, packaged mobile application platforms, or application suite vendors.

Position and Adoption Speed Justification: This technology is positioned as coming up the Slope of Enlightenment, and it continues toward the Plateau of Productivity, as MEAP and point solution vendors, selling through integrators and wireless carriers, begin to scale business models. A subset of MEAP vendors, along with a few sales force automation (SFA) specialists, are moving the market forward by combining single-focused application packages built to extend common desktop applications to mobile that require little integration effort with creative pricing and billing relationships. Gartner has observed smaller vendors and new entrants experiencing normal challenges in scaling as the number of users increases. The adoption rate, driven by more widely deployed enterprise application suites, will, in the midterm, increase among niche vertical

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markets and small or midsize business (SMB) users. Large enterprises with the desire and scale to stage mobile applications will remain in the majority of adopters for the next three to five years.

User Advice: When enterprises want to test the mobile application "waters" without a significant upfront investment, or business units face severe capital-spending constraints, this can be an appropriate method. Pay attention to three-year total cost of ownership (TCO), because, in some instances (such as large stable deployments), the TCO for mobile software as a service (SaaS) can be substantially higher than for seat licensing. Look at mobile SaaS and application service providers (ASPs) for tactical advantage, especially at the departmental level, or when IT resources or capital budgets are too limited to address mobile project requirements. IT organizations and business units must assess the functional fit (although most mobile ASPs can provide limited tailoring) and ensure that there is adequate out-of-the-box configurability. Adding additional applications or a rapidly growing user base may push the costs of this method higher than a comparable behind-the-firewall method. SMBs with limited means or funds for customization need to evaluate whether standard packages are agile enough (for example, through configuration parameters or well-documented Web services) to meet specific needs.

Business Impact: In some cases, on-demand MEAPs can reduce the break-even payback time on mobile projects to fewer than two months, by lessening capital expenditures on mobile project software. If mobile devices are also leased, this effect of shifting expenditures from a capital expenditure to an operating expenditure can be accentuated. When there is volatility in the demand for mobile licenses, the effect on businesses can be positive; however, for businesses that have a good idea of what the demand is, the long-term higher TCO outweighs the benefits. Enterprises using pay-as-you-go methods can pilot applications without investing in server licenses and by limiting integration expenditures.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Antenna; salesforce.com; Spring Wireless; Xora

Recommended Reading: "Magic Quadrant for Mobile Enterprise Application Platforms"

"MarketScope for Packaged Mobile Application Platforms"

"Magic Quadrant for Field Service Management"

Mobile POS

Analysis By: Mim Burt

Definition: Mobile POS refers to a point of sale (POS) application that is usually delivered on a retailer-owned portable handheld card swipe device or terminal, using wireless communications. The mobile POS application can be used for scanning, queue busting or payment processing. Currently, the majority of handheld mobile POS units are deployed for queue busting, with customer associates able to ring up sales whenever and wherever needed, improving flexibility and customer service. However, in the past 12 months, some Tier 1 retailers have deployed mobile POS full payment capability on traditional handheld terminals. A few smaller retailers have deployed mobile POS on devices such as the Apple iPod touch with portable printers.

Most POS application vendors targeting the Tier 1 retail market (retailers with annual revenue of $2 billion or more) offer the capability for mobile POS. In the past year, some have been keen to demonstrate the ability to port these applications onto Apple iPads and Apple iPhones.

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Position and Adoption Speed Justification: Mobile POS solutions continue to garner interest among Tier 1 retailers for the following reasons:

- Many Tier 1 retailers, particularly in the grocery industry, are moving toward multiple store formats, with a renewed focus on smaller neighborhood stores. These retailers, as well as retailers with traditionally smaller-footprint convenience and drugstores, are also expressing interest in deploying mobile POS to reduce queue lengths and to release floor space for more merchandising. Other retail store models, such as pop-up stores, temporary stores (for example, at events) and concession stores (a store within a store), would also benefit from mobile wireless POS.

- The continued trend toward the consumerization of IT. This trend focuses on how enterprises will be affected by and can take advantage of new technologies and models that originate and develop in the consumer space, rather than in the enterprise IT sector. Mobile phones, in particular, are key players in this trend, and are encouraging businesses to reconsider their traditional positions on the acquisition, management and deployment of IT, especially with the combination of affordable devices, low-cost communications and the growing diversity of applications, such as POS for mobile devices.

- Continued hype around the launch of the Apple iPad and NFC-enabled smartphones.

Tier 1 retailers are definitely researching mobile POS capability as part of POS upgrades or as part of a move toward consolidation of associate-facing applications onto one device. This has translated into a few rollouts in production. However, despite these implementations, the growth in deployments of mobile POS will be moderated by the following factors:

- Consumer fears and negative perceptions about the security of payments

- Mobile POS not factored into the first phase of POS upgrades/replacements or not included in the initial POS business case, as well as retailers having to make a case to include mobile POS in the store associate-facing application portfolio together with, for example, applications for stock management, price checks, task management and communication

- Retailers' efforts to secure payment data in compliance with industry security standards, as well as to secure cash payments on the store floor

- Some business processes at check-out for some segments not being suitable for mobile POS — for example, items of apparel requiring detagging, folding and bagging

- Slow rate of convergence of mobile POS applications with applications for emerging payment technologies, such as contactless and biometric payments

- Integration of third-party mobile POS applications with the retailer's main POS application running on the traditional check-outs

On this year's Hype Cycle, the mobile POS technology profile has been plotted at the trough-plateau midpoint juncture and is poised to take advantage of continued levels of retailer interest as they look to enhance the customer experience on the store floor. More and more retailers will consider factoring in mobile POS as an application to be included in the store associate application portfolio. However, the moderating factors called out mean that the time to plateau still stands at between five and 10 years, although we expect this to be nearer to five years.

User Advice:

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- Factor in the business case for mobile POS when looking at store associate-facing applications — not just as a business requirement for POS upgrades, but also as a business requirement to be included when refreshing the traditional handheld application portfolio for store associates, for example, together with stock management and price checkup applications.

- Consider using mobile POS during peak periods in high-volume, straightforward payment processes (for example, for the grocery, convenience and drugstore segments). In addition, carefully consider what applications to deploy on mobile POS — queue busting only or with full payment. Remember to factor in cross-channel transaction processes, such as reserve online and check out or pick up in the store.

- Ensure that any applications you use for payment transactions adhere to industry data security standards, such as Payment Card Industry Data Security Standard (PCI DSS) and data protection requirements. Note that the retailer is responsible for any third-party vendor's compliance to PCI standards.

- When investigating third-party mobile POS applications on devices such as Apple's iPhone and iPod touch, consider how the third-party mobile POS applications that are developed specifically for those devices will integrate with the main POS application running on the fixed check-outs in the store.

Business Impact: Customers cite faster check-outs as a key customer service basic. If used appropriately, mobile POS can improve customer service in the store, especially during peak trading periods, such as the Christmas holiday period. If appropriate for the business model, retailers operating smaller-footprint, compact stores should consider mobile POS to replace fixed-check-out areas, thus releasing floor space for more merchandising.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Mature mainstream

Sample Vendors: Fujitsu; Motorola; Oracle; SAP; Wincor Nixdorf

Recommended Reading: "Retailers: Let Customers Guide Your Investment in Mobile POS"

Mobile IM

Analysis By: Monica Basso

Definition: Mobile IM refers to the use of an online IM application, including presence and buddy lists, on a mobile device and a wireless network.

Position and Adoption Speed Justification: The development and adoption of mobile IM are progressing rapidly in different regions. Our user survey data points out that 28% of respondents are using mobile IM, with another 7% showing strong interest in using it in the next 12 months. Standards are developing, such as the IM and Presence Service (IMPS) protocols from the Open Mobile Alliance initiative and Jabber on the Internet. However, the technology remains fragmented, with different IM approaches and products.

Handset manufacturers are increasingly adding mobile IM capabilities to their products, preinstalling clients on their phones for connecting them to proprietary IM services. For example, Research In Motion's (RIM's) BlackBerry devices are equipped with BlackBerry Messenger; Windows Phone devices are equipped with a Windows Live client. Apple announced its own new mobile IM service, planned to roll out later in 2011.

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Most smartphones ship with preloaded clients to connect to selected Internet IM services. Alternatively, users can download mobile IM clients to connect smartphones with a variety of Internet IM services, such as Windows Live, Yahoo, Google Talk, AOL Instant Messenger (AIM) and ICQ. Mobile IM clients are also available to connect smartphones with private collaboration platforms, such as Microsoft's Lync (previously called Office Communications Server [OCS]) and IBM's Sametime. Particularly in younger generations, BlackBerry Messenger is increasingly used as a substitute for SMS, to avoid SMS charges.

Meanwhile, mobile operators offer subscribers the mobile IM services built on proprietary infrastructures or integrated with Internet IM systems through specialized platforms. Examples include Cingular with Microsoft Network (MSN), and NTT Docomo i-mode with MSN and Yahoo, as well as Telefonica O2 with ICQ in Germany. Mobile carriers have been concerned that mobile IM adoption might affect their lucrative SMS businesses by providing an alternative for personal messaging. This has limited their commitment to this technology; however, mobile IM represents a complementary tool to SMS and voice for mobile personal communications and may drive further consumption of any services, as shown by some deployments. Younger people's increasing tendencies to use mobile IM with social networks will progressively put demand on carriers to support open mobile IM services. Key mobile operators — such as China Mobile, TeliaSonera, T-Mobile, Telefonica, Telecom Italia Mobile (TIM) and Vodafone — are exploring this approach.

While mobile IM services originated in the consumer space, they are now progressively expanding into the enterprise market. In addition to public services, enterprises increasingly deploy corporate IM and presence on smartphones — particularly through the mobilization of Microsoft Lync through mobile communicator clients.

Social networks like Facebook and microblogging sites like Twitter are recording increased usage on mobile devices, and are set to become hubs for mobile personal communications. In the long term, this trend will affect mobile IM and will allow it to become superseded by mobile social networks before it reaches 30% market penetration.

User Advice: Carriers should pursue integration with established Internet IM systems, such as AOL and MSN, to effectively face the growing competition and potential disruption mobile IM could bring to the SMS business. Internet IM providers should make carrier-independent mobile interfaces available to their IM services to enable their subscribers to access the service with mobile devices, as well as computers. They also need to make sure their mobile IM services integrate with email and social networking.

Enterprises may have difficulty deploying wireless IM to their employees because of fragmentation; in the short term, they should focus on wireless email or SMS as mobile messaging tools. However, they also should take advantage of mobile IM, where applicable, because it will increasingly be used as part of mobile collaboration paradigms during the next three years.

Business Impact: There will be a broad impact on organizations with large mobile workforces, because mobile IM is an enabler for enhancing real-time collaboration. For mobile operators, mobile IM is an opportunity to deliver a comprehensive offering around personal messaging, in addition to SMS, multimedia messaging service (MMS) and email.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

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Sample Vendors: Comverse; IBM; Logica; Microsoft; Nokia; Palringo; Research In Motion; Synchronica; Tekelec; WebMessenger

Recommended Reading: "Mobile Carriers Should Embrace Internet-Based Instant Messaging Services"

"Findings: Mobile Messaging Becomes Part of Unified Communications and Collaboration"

"Wide Array of Communications Overwhelms Users"

Mobile Search

Analysis By: Sandy Shen

Definition: Mobile search lets people search for information on mobile devices, and integrates contextual cues such as location, time of the day and user preferences to provide relevant results.

Position and Adoption Speed Justification: Generic keyword search has evolved to a level where it is now good enough on the mobile phone that many people don't have to resort to the PC. Although there is room for improvement, such as more mobile content and better indexing, the increased penetration of smartphones with full browsers has helped greatly, since searches can return Web pages when mobile content is not available.

Specialized search integrating a user's contextual information is still developing — combining the data acquisition capabilities of mobile devices with the potential of online processing power offers infinite possibilities. For example: Amazon has an app that allows users to search for products based on photographs taken on the mobile device; Shazam is a music recognition service based on acoustic fingerprints; Polar Rose has a face recognition service that can identify someone by searching social networks and matching their photo; and Siri has a personal assistance application that integrates location, online reviews and ratings, and user preferences to deliver personalized and automated services. These services only scratch the surface of context-based mobile search, but represent how specialized search will evolve in the future.

User Advice: Companies should:

- Optimize your mobile site for popular search engines to ensure that it is searchable by keyword.

- Incorporate technologies that can drive usage of your core businesses. Examples include driving in-store shopping traffic toward the online medium, and enabling interaction between online social networks and offline activities.

- Partner with specialized search providers to drive traffic to your businesses. Siri helps users make reservations with its partners such as OpenTable, Taxi Magic and Ticketmaster.

- Protect user privacy by employing opt-in and opt-out mechanisms, and by strictly monitoring how user data is used and shared with business partners.

Business Impact: Companies can use mobile search to increase site traffic. Mobile operators can expect higher network traffic and more content purchases as a result, and may also share advertising revenue with search providers. Some vertical industries are more suited than others to exploit search-based advertising, such as restaurants, hotels, car rental firms, parking lot companies, gas stations, hospitals and cash point providers.

Benefit Rating: Moderate

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Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Amazon; Apple; Baidu; ChaCha; Google; Microsoft; Nuance; Shazam; V-Enable; Yahoo

Recommended Reading: "Market Insight: Ten Consumer Mobile Applications to Watch in 2012"

Embedded Cellular Data

Analysis By: Hugues J. De La Vergne

Definition: Cellular data implementations are embedded in notebooks, as well as in media tablets and other small form factor devices. The cellular or wireless WAN technology embedded in notebooks is typically wideband code division multiple access (WCDMA) or High-Speed Packet Access (HSPA). Some modules, primarily in emerging markets, also support cellular data standards, such as general packet radio service, Enhanced Data Rates for Global Evolution/HSPA or cdma2000 Evolution Data Optimized, which includes Revision 0, Revision A and radio transmission technology. Recently, modules that also support Long Term Evolution (LTE) were launched in many key markets, such as the U.S. Chips, such as Gobi from Qualcomm, have entered the market, providing close to global support of various standards and some level of upgradability.

Position and Adoption Speed Justification: In the past, the volatility of cellular technology, and the limitations on roaming and expensive data plans made embedded cellular data impractical for broad deployment. However, cellular data has enjoyed a period of relative stability because of the launch of high-speed technologies, such as HSPA and the availability of LTE from 2010 through 2012, which greatly improves the Web-browsing experience. LTE speeds are fast enough such that LTE will be the driver that will give consumer electronics producers the confidence to embed cellular connectivity into CE devices. LTE should provide a stable platform for at least the next 24 to 36 months, which is key as many embedded CE devices have a 24- to 36-month life cycle. We have seen carriers starting to adopt daily or monthly pay-as-you-go service plans with a daily/monthly roaming cap that can reduce costs and speed up the ROI of buying embedded cellular data cards for a broader variety of users.

Embedded cellular data will be driven by end users who need to have their consumer electronic devices and laptops connected to the Internet. Although we have seen operators get more aggressive with rate plans in certain regions, high rate plans remain the largest impediment to growth. Many end users are paying for wired broadband at home and have a smartphone data plan and view potentially $40 to $50 per month for each additional device to be too expensive. Growth will expand much more quickly once operators move toward a "bucket" of data for individuals that they can allocate between their devices, similar to voice family plans that give the user the ability to share minutes between all mobile devices on their plans. Gartner expects these changes to expand rapidly in the coming 12 months as embedded modems grow from 68.4 million units in 2011 to surpass removable modems in 2012 with sales of 116.9 million units. Growth continues in the later years driven by products, such as media tablets and embedded modems, which will reach 333.1 million units in 2015.

User Advice: Consider embedded cellular data technologies for vertical applications that have predictable use patterns and a clear ROI case. Also consider embedded cellular data technologies for targeted segments of the horizontal user population as the life cycle of embedded cellular data cards becomes more closely aligned with laptop replacement cycles, as technologies for upgrading modules improve and as pay-as-you-go service plans align closer with specific user requirements.

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Business Impact: Embedded cellular data technology will affect telecom strategies and economics for mobile users with notebook computers, media tablets and other connected form factors as organizations choose from a variety of wireless communications options. This move will have sourcing implications, because notebooks with embedded cellular data are being subsidized by mobile operators. Devices with bundled communications, such as e-book readers, personal navigation devices, digital photo frames and entertainment devices, offer business opportunities as well.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Dell; Fujitsu Technology Solutions; HP; Lenovo

Recommended Reading: "Changes Coming for Embedded 3G in Notebooks"

Mobile Application Development

Analysis By: Michael J. King; William Clark; Nick Jones

Definition: This technology involves mobile application development (AD) in its most generic sense for enterprise end users and customers of any enterprise. The intent is to chart the general development for mobile devices, such as feature phones, smartphones, media tablets and mobile laptops. The architectures covered in this profile relate to mobile AD, but focus primarily on thick-, rich- and thin-client development. In addition, there are technologies and accompanying positions for the platforms used to develop and deploy these applications to end users and customers — mobile enterprise application platforms (MEAPs) and mobile consumer application platforms (MCAPs), respectively — as well as for the client devices or networks used to access them.

As the demands on IT departments have increased, in terms of applications they must support (in a mobile sense) and the number of devices end users are carrying, mobile AD has matured from the single-focus applications (often confined to a single device) to a wider addressable audience of device types, computing styles and application environments. Gartner envisions a world in which many of the applications that an enterprise enables for its mobile users will not be developed or maintained by that enterprise, but rather provisioned through public app stores or added on as part of purchasing ERP, supply chain management or CRM systems. In addition, the applications that are built and owned by that enterprise will be required to run on multiple OSs, across many device types (tablets, smartphone, etc.) and corresponding computing styles.

Position and Adoption Speed Justification: Enterprises are investing in mobile AD at an accelerating pace, driven by such factors as the penetration of smartphones and tablet devices into the consumer and enterprise markets. Given the wide variance of devices and OSs, the growing number of applications and the early stages of the applications themselves, Type B organizations that have not invested in mobile application development resources are increasingly finding themselves looking at outsourcing the development of the second wave of mobile applications. Type C organizations are pressing forward with initial rollouts of off-the-shelf or prebuilt applications.

User Advice: Enterprises need to be aware of the six styles of mobile application architecture: thick, thin, rich, streaming, messaging and no client. Based on the type of mobile application architecture, large enterprises supporting strategic mobile development need to consider MEAPs and MCAPs, as appropriate, and need to link business strategy to each set of platforms by keying off the size of the audience addressed, the range of devices to be supported, total cost of ownership, security and usability. Given the growth and breadth of mobile development demands,

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enterprises need to plan for the use of specialist tools, including those for testing and the user interface.

Business Impact: The business impact of mobile applications can be significant, whether it is a transformation of the customer relationship via that mobile application, or the enablement of employees to be more impactful, via increased efficiency or better and faster customer relations. Benefits generally fall into three categories for workers: efficiency improvement, greater effectiveness for mobile workers or reductions in errors. For consumer-facing applications, customer loyalty through convenience, targeted marketing and sales scenarios drive benefits. The overall impact can range from 10% of mobile worker payroll to billions of dollars spent on consumer advertising over mobile phones. The impact on retail sales alone for context-aware mobile applications is estimated to be $96 billion by 2015.

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

Sample Vendors: Antenna Software; Apple; Microsoft; Netbiscuits; Nokia; Pyxis Mobile; Research In Motion; Sybase; Syclo

Recommended Reading: "Magic Quadrant for Mobile Consumer Application Platforms"

"Magic Quadrant for Mobile Enterprise Application Platforms"

"Mobile Architectures, 2009 Through 2012: A Trend Toward Thin"

Mobile Sales Force Automation for Opportunity Management

Analysis By: William Clark; Michael Dunne

Definition: Mobile sales force automation (SFA) for opportunity management involves the tight integration of opportunity databases, linking SFA applications on smartphones, tablets or wireless PDAs with sales back ends on servers, as well as with native personal-information-manager (PIM)/calendaring functions. Mobile SFA enables schedules and tasks for marketing, inside sales, mobile sales and field forces to be automatically updated.

Position and Adoption Speed Justification: The maturation and uptake of smartphones — driven by the further penetration of Apple's iPhone in organizations, as well as advanced models from Nokia, Research In Motion, Motorola, HTC and Samsung — are creating pull for all mobile SFA applications. Opportunity management is one of the common base functions, and many SFA vendors have opted to forgo tight integration with calendaring systems, etc., by providing mobile portals. Although this type of approach has notable shortcomings, such as the lack of offline capability or redundant data entry, it is contributing to uptake. These two factors mean that most organizations with an SFA investment have at least two options:

- The mobile SFA extension offered by their incumbent vendors

- Packaged mobile applications targeting their vertical industries

However, most organizations still find it difficult to tightly integrate back-end sales applications with calendaring functions on mobile devices. Despite improvements, adoption was previously slowed by the challenges of providing a rich user experience on devices, based on a widening number of OSs, particularly the Apple iOS and Android, with limited screen size and input capability. In contrast with other mobile SFA functions, these are ideal for smartphones, so the positive effect of media tablets isn't as great. The effort to provide such functions can be lessened

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by managing the scope of the applications, because salespeople don't use smartphones for a lot of writing, but more for reading and retrieval of information, particularly with respect to opportunity data. Salespeople won't spend much time entering notes and updating client status on the OMS.

User Advice: Evaluate vendors on their road maps for providing software platforms that unite the mobile email, instant messaging, PIM and opportunity management functions. View sales teams based on their need for collaboration, and put processes in place to collaborate across workgroups to maximize customer intimacy. Enterprises that require salespeople to access sensitive data through a VPN, such as in the pharmaceutical industry, need to consider mobile VPN technology. Or they should rethink mobile enterprise application platform approaches to make the process less cumbersome, such as in handling cases when voice calls disrupt the data connection (a problem on some wireless WANs), or when the device switches networks. Evaluate vendors according to how they ensure that the application user interfaces are relatively streamlined for field sales workflows (so that salespeople have to enter only three or four key points before and after a call as a goal, with a number of entries potentially requiring just a click on predefined options), and that they include word completion functionality.

Business Impact: Opportunity management using mobile SFA requires an overarching business strategy to drive higher benefit levels, including shortened sales cycles and increased revenue per sale.

The business impact can be high in cases that require team selling or close collaboration across sales and marketing functions, as well as field sales with high-target annual earnings (or expensive field sales), for improving adoption of/compliance with requirements for entering data. Businesses benefit from the immediacy/convenience of mobile SFA, such as the ability to enter key data points before and after a call, leading to a better set of data for management to review and, in some cases, increasing customer satisfaction and improving the perception of a company's brand. However, business impact is typically moderate, because:

- Most organizations have not reached this level of process efficiency, so the effort to put the system in place dampens ROI.

- Organizations that have reached this level of process efficiency view this capability as complementary, rather than core functionality.

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Emerging

Sample Vendors: Oracle; Oracle Siebel; salesforce.com; SAP; StayinFront

Recommended Reading: "SAP and Research In Motion Begin Partnership in Mobile Sales Force Automation"

"Mobile Sales Force Automation: Architecture, Support and Technology Choices Can Cut Costs 12%"

"Evaluating SFA Functionality for Smartphones"

"Critical Capabilities for Mobile Enterprise Application Platforms"

Location-Based Services

Analysis By: Annette Zimmermann; Nick Ingelbrecht

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Definition: Location-based services (LBSs) use information about the location of mobile devices, derived from cellular networks, Wi-Fi access points, or via satellite links to the receivers in (or connected to) the devices themselves. Examples are: services that enable friends to find each other, or parents to locate their children; or mapping and navigation services. LBSs may be offered by mobile network carriers or other providers. They are also known as location-aware services. Location is one of the critical elements that shape richer context-aware services. Context services strive to deliver a message, service or offering with the context of the user in mind. Context can be a user's personal information, preferences, habits, gender, age and location. The more context elements, apart from location, that are taken into account, the richer the user experience will be.

Position and Adoption Speed Justification: We expect close to 370 million LBS users (including paying subscribers and those that use free software) by the end of 2011. Most growth will come from off-deck solutions. Based on Gartner's research and forecasts, the applications that will generate the highest interest in the next few years will be navigation, location search and friend finder/social networks. Revenue generated from LBS including user spend, advertising and transaction-based pricing will yield $8.3 billion by the end of 2014.

The growing popularity of social networks has a strong influence on users' interest in, and need of, location services. Large social networks like Twitter and Facebook have added location features, or provide APIs to developers to link their location applications to the larger Web communities. There has been much hype around so-called check-in location applications such as Foursquare, Gowalla and MyTown, where subscribers "check-in" via the application, accrue rewards and explore different locations. Moreover, the hype around Groupon-like offerings has led Facebook and Google to enter this market with their own solutions (Facebook Deals and Google Offers), after Google's failed attempts to acquire Groupon in 2010. The success of all these services has been mixed. On the plus side there has been continued strong user growth, increased awareness among merchants and profitability in some cases. However, most startups and even some larger players are far from generating profits, as they are still searching for the right business model. In addition, some anecdotal evidence tells us that the measured impact of revenue/store traffic has been mixed — ranging from a 15% increase in some cases, but often as little as 2%, and then only temporarily, not maintaining the same level once the promotion is over.

There has been a large number of vendors entering the LBS space over the past year, including large organizations from the retail industry looking to bring more targeted offers to their customers. M&A activity will continue, such as the acquisition of Aloqa by Motorola in 3Q10. North American communications service providers (CSPs) have been able to generate substantial profits from location services, especially from so-called child-tracking solutions, in the past and we expect the popularity of this service to continue. However, the availability of free voice-guided navigation by Google and the popularity of the Android platform are putting pressure on current business models. CSPs across Europe have launched free navigation services for their iPhone customers in order to reduce churn.

As location-based technologies and services have improved, privacy protection has become an increasing concern for consumers, vendors and regulators, as illustrated by the challenges faced by Apple at the beginning of 2Q11. Users tend not to be fully aware of their privacy exposure, but technology and service providers face a negative consumer backlash if they fall short of customers' expectations. This could involve class action lawsuits and much tougher regulatory intervention, depending on the country market (see "Market Trends: Top 10 Consumer Macro-Trends, Worldwide, 2010-2020" and "Predicts 2011: The Interconnected Consumer").

For the time being, however, most users will continue to look for higher value contextual services and be ready to trade-off some of their privacy to the brands they trust in order to receive location-specific services.

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User Advice: Enterprise users should review the maturity, availability and opportunities presented by location services in their target business-to-consumer markets, with a view to product development and target marketing. Investigate the potential of low-cost location applications to improve productivity and reduce costs. For example, although the effects that LBS has had on revenue in the retail space have been mixed, the opportunity outweighs the very low risk of going ahead with an LBS solution.

Service providers and vendors should bundle smartphone offers with interesting location service applications. Encourage third-party innovation on your platforms and focus on creating a developer-friendly ecosystem.

Technology and service providers must conduct privacy audits on their consumer facing location services in order to minimize brand exposure to problems associated with security breaches and negative market reaction to trading location data.

As consumer devices with location and presence functionality become more ubiquitous, new opportunities are emerging for games, social media and targeted marketing. Plan for a future of content, products and marketing strategies that deliver a much richer contextual experience for the consumer, with opportunities for micro-targeting content and marketing messages.

Business Impact: Location services have an impact on numerous business functions and industries. They enable enhancements in customer service management, improve workforce management, increase efficiency for service delivery and promote new services to end users. Governments are using these services to combat crime and terrorism, and for law enforcement, emergency services, social control, traffic planning, transport and construction. Retailers and CSPs can increase customer traffic to their sales points, and event organizers can provide tools to their clients so that they get the most out of their visit to an event.

Widespread adoption of LBSs will be driven by the integration of many different capabilities that together fulfill more of the potential of location-sensing technology. This has already started to happen in the convergence of location functionality with other applications such as social networking, news, information, search and entertainment services. The flurry of announcements around application stores and opening the network to developers has added a new twist to the competitive landscape. We will see more examples like those of Google, Yahoo and other Internet search providers that have started to provide search with in-built location-based functionality, and players like Palringo offering a comprehensive mobile instant messaging platform that includes location features.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Google; LocatioNet; Loopt; Nokia; Polaris Wireless; Skyhook; TeleNav; Telmap; Vodafone

Recommended Reading: "Forecast: Consumer Location-Based Services, Worldwide, 2008-2014"

"Dataquest Insight: Mobile CSP's Strategies Will Diverge in the Next Five Years"

"Cool Vendors in Consumer Mobile Services, 2011"

"Cool Vendors in Consumer Applications, 2011"

"Cool Vendors in Context-Aware Computing, 2011"

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Entering the Plateau

Mobile Sales Force Automation for Orders/Inventory

Analysis By: William Clark; Michael Dunne

Definition: This technology involves the use of wireless applications from various sources — including prepackaged, embedded and mobile enterprise application platform (MEAP)-based tools — to improve the timeliness, accuracy and currency of order/inventory information. It enables the real-time look-up of inventory status in current locations, as well as other locales or warehouses, along with order submittal. Mobile sales force automation (SFA) includes documentation of orders through electronic signatures on documents and credit card swiping.

Position and Adoption Speed Justification: Large software vendors (such as SAP and Oracle), pushed by best-of-breed mobile specialists, are making solid, but slow, progress on the platforms and tools necessary to create these applications. Lower wireless connectivity costs, intense interest in media tablets (when extended real estate can make inventory look-up easier) and less-expensive devices are improving the return on investment of mobile order and inventory management. This is becoming more common among sales forces in industries with tight margins, where inventory carrying costs and stock-out situations are major concerns.

Typically, wireless order/inventory management is difficult to implement, because of the amount of back-end integration required. The "sweet spots" are wireless PDAs and smartphones. Tablet and laptop-based applications have proliferated in some vertical markets, such as pharmaceutical sales and consumer packaged goods (CPG), with some pilots and smaller deployments seen in retailers. MEAP and SFA vendors are making progress in using HTML5/rich Internet application (RIA) techniques to more quickly bring functions to market.

User Advice: This technology is particularly well-suited to CPG, direct store delivery, retailers and merchandisers. IT organizations should assess mobile business workflow carefully, paying specific attention to how rapidly information can be passed among parties involved in transactions, how frequently underlying IT systems can provide updates, and how quickly physical systems or partners can respond. By doing so, IT departments can determine the optimal set of order and inventory fields required in the application, which will reduce the need for "big bang" integration, in which large sections of databases must be replicated.

Business Impact: Because this technology has a direct effect on customer satisfaction/fulfillment and the reduction of stock-outs/overstocks, its impact is significant. Mobile SFA has the greatest effect on CPG, direct store delivery, retailers and merchandisers. Customer satisfaction is increased by helping salespeople become more responsive to client needs at the point of sale and at more customer touchpoints. Adoption is steadily increasing, and implementation requires vertical industry expertise. Implementers need to consider security use cases, such as when a device needs to be handed over for someone else to sign off, and possibly out of its owner's sight and control.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Antenna; Neoris; Oracle; Pyxis Mobile; salesforce.com; SAP; Spring Wireless

Recommended Reading: "Use Sales Force Role Requirements to Choose Mobile Devices and Connectivity"

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"Mobile Sales Force Automation: Architecture, Support and Technology Choices Can Cut Costs 12%"

"Selecting the Right Smartphone Platform for Sales Force Automation"

"Evaluating SFA Functionality for Smartphones"

"Harry Rosen Improves Retail Sales Effectiveness With Superior Information Access"

"Magic Quadrant for Mobile Enterprise Application Platforms"

"SAP's Mobile Strategy Will Force Enterprises to Make Complex Choices"

"SAP's Purchase of Sybase Adds Complexity to the Mobile Software Market"

Location-Aware Applications

Analysis By: Monica Basso

Definition: Location-aware applications use the geographical position of a mobile worker or an asset to execute a task. Position is detected mainly through satellite technologies, such as a GPS, or through mobile location technologies in the cellular network and mobile devices. Examples include fleet management applications with mapping, navigation and routing functionalities, government inspections and integration with geographic information system applications.

Position and Adoption Speed Justification: The market is maturing in all regions, with multiple offerings for enterprise and consumer use. An increasing number of organizations have deployed location-aware mobile business applications, most of which are based on GPS-enabled devices, to support business processes and activities such as dispatch, routing, field force management (for example, field personnel, field engineers, maintenance personnel and medical personnel on ambulances), fleet management, logistics and transportation. Mobile workers typically use a smartphone connected via Bluetooth to an external GPS receiver, a GPS-enabled wireless device or a dedicated personal navigation device. They may also use laptops or ruggedized devices. Location-aware applications include messaging, especially in the government sector, where operational efficiency can be achieved (for example, so that the nearest road crew can be dispatched to fix a water main break without a delay in determining who is where). Worker safety applications for different roles are also being deployed, with a combination of motion sensor and location, such as energy utility workers, lone workers in gas stations or social workers. Platforms in this area integrate at different levels with corporate applications, such as ERP, sales force automation and HR systems, offering capabilities to enhance, support and automate business processes. Benefits like cost savings and increased efficiency can be achieved by deploying these location-aware solutions.

Other services (often referred to as "infomobility services") enable people to move on streets and roads more easily, through traffic flow monitoring and management. Countries in which mobile penetration is extremely high and road traffic congestion is a serious issue have some potential for adoption. However, these services are in their infancy, particularly when it comes to services for citizens. During the past couple of years, local municipalities and public transportation companies in North America and Europe have launched several initiatives. For example, in Italy, public bus and subway systems in main cities (e.g., Milano, Rome, Torin) provide real-time information for end users with expected vehicle time of arrival, delays and connections through lines at the station/platform and on board of vehicles. Mobile app vendors, such as Modomodo offer applications through main app stores for mobile devices, such as an iPhone, to access real-time information on transportation services, paths, and/or available car parking space with location (e.g., see Modomodo's ATM Mobile application). Despite the still fragmented availability

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and lack of integration with other key services, such as mobile payments or booking, such initiatives are emerging and progressively appeal to smartphone users.

Mapping, navigation and tracking applications and services are also available for consumers — for example from Nokia Maps, Google (Maps and Latitude), Yahoo (Maps) and TeleNav. In the area of sport and fitness, multiple applications and services are available, such as Sports Tracker and MapMyRun.

User Advice: User organizations with numerous groups of employees moving frequently outside a fixed location — on a campus, or on a national or an international basis — should consider the benefits of deploying applications that enable them to provide status information or support to staff and/or customers based on the geographical location of a person or asset in real time. The security and privacy of user location information should be a key consideration in the development, deployment or acquisition of location-aware applications.

Business Impact: Location-aware applications can be deployed in field force automation, fleet management, logistics and goods transportation in sectors such as government, healthcare, utilities and transportation.

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

Sample Vendors: Appear Networks; Gamma Engineers; Google; IBM; modomodo; Nokia; TeleNav

Recommended Reading: "Location Technologies: Sensors, Tags, Beacons and More"

"Tracking People, Products and Assets in Real Time"

"Gartner's Top Predictions for IT Organizations and Users, 2007 and Beyond"

Mobile Enterprise Application Platforms

Analysis By: William Clark; Michael J. King

Definition: Mobile enterprise application platforms (MEAPs) combine tools, including development, application and device management/security, and integration; mobile middleware, including client- and server-side; and prepackaged applications that enable enterprises to provide mobile extensions to commercial off-the-shelf applications, as well as custom solutions. MEAPs have evolved from a niche market, known previously as multichannel access gateways (MAGs), a term Gartner began using in 2002, as well as wireless application gateways (WAGs), a term used from 1998 to 2002.

MEAPs consist of client- and server-side middleware, accompanied by tools or packaged as plug-ins, that enable mobile applications to work well across a diverse set of devices and networks. They are provided by tool, database, software infrastructure and mobile device/operating system vendors — such as Apple, Oracle, IBM, Research In Motion (RIM), SAP-Sybase and Microsoft — and application-centric MAGs, such as Syclo, Spring Wireless and Antenna.

Position and Adoption Speed Justification: With the advent of WAGs in 1998, Gartner identified this class of mobile middleware. In 2002, we broadened the definition to include nonwireless devices, such as kiosks, when we introduced the term "MAG." In 2008, Gartner modified the name to indicate that the functionality had broadened into that of a middleware/integrated development environment platform, rather than a niche gateway supported

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by specialist tools. Uptake has been slow and steady, with overall market penetration of approximately 20% of large mobile projects. In 2010, growth accelerated by the fragmentation of the smartphone market, particularly the increased use of the BlackBerry and the iPhone OS in business applications; in 2011, the demand for enterprise support of tablets further accelerated the uptake.

Most Type A (leading-edge) organizations have considered MEAPs and generally either use single-platform targeted vendors (like Microsoft Windows Mobile, RIM or Apple) or specialist vendors (like Syclo, SAP-Sybase or Antenna) that offer cross-platform code generation options. Gartner expects interest from Type B (mainstream) organizations to continue to substantially increase, and Type A organizations that have had single-mobile-platform strategies to accelerate with increased demand for more-diverse smartphone support, such as for Apple's iPhone, and Linux Java-based offerings, such as Android. In 2011 to 2012, Gartner expects more MEAP vendors to add HTML5 and mobile Web capabilities, and that there will be an increased overlap with MCAP vendors. Multichannel requirements for kiosks, TVs, in-vehicle systems and more tablets will continue to fuel change and innovation.

User Advice: Typical alternatives to MEAPs or modified uses include thin-client approaches, which, for many enterprises, are not adequate, because they do not handle offline access for out-of-network coverage. MEAP vendors are reacting to this by adding HTML5 code generation capabilities. MEAPs also compete with packaged mobile application vendors, and with mobile extensions by sales force automation (SFA) or other application vendors. Some MEAPs focus on software-as-a-service (SaaS) offerings. Those that focus on SaaS exclusively are finding the need to support on-premises implementations and licensing as well.

Use cross-channel MEAPs when custom solutions are required, especially when investing in more than three projects, or if end users require two or more types of devices to be supported. Consider mixing and matching MEAP offerings, anchoring core strategies on development and enterprise application tools, and augmenting with other MEAP components, such as mobile device management. Some MEAPs provide options within their tools to generate thin- and thick-client versions of their software. MEAPs are also candidates for the support of context-aware applications for business, because they support information integration, including location, especially when used in conjunction with unified communication and collaboration (UCC) platforms.

Business Impact: For enterprises with large field service or sales forces, the impact of MEAPs can be high. Project times can be reduced, and overall total cost of ownership for mobile line-of-business application support can also be reduced.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Mature mainstream

Sample Vendors: Antenna; Apple; IBM; Microsoft; Research In Motion; SAP; Sybase; Syclo

Recommended Reading: "Magic Quadrant for Mobile Enterprise Application Platforms"

"Critical Capabilities for Mobile Enterprise Application Platforms"

"Key Issues for Mobile Applications, 2011"

Telecom Expense Management

Analysis By: Phillip Redman

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Definition: Telecommunications expense management (TEM) includes the management of fixed and mobile communication services and hardware. It may also include professional services that support sourcing, auditing and strategy. TEM employs offerings ranging from an on-premises and software-as-a-service (SaaS)-based application, to a managed service scenario to full business process outsourcing (BPO) offerings for managing telecom spending. Eventually, stand-alone TEM offerings disappear, and managed mobility services, which incorporate TEM and mobile device management (MDM), emerges as a wider outsourcing offering.

Position and Adoption Speed Justification: TEM has been stabilized in service offerings during the past four years and is considered mature in North America. However, on a global basis, TEM offerings are still developing, often transforming from software to a managed service, which is a standard offering in North America. During the past year, there was significant consolidation of major TEM vendors, which is expected to continue for the next 12 to 24 months. TEM continues to be adopted mainly as a managed service, though full business process offerings are maturing and being adopted. Fully managed BPO continues to be a fast-growing area, as companies look to fill in missing resources by outsourcing the service management components, such as rate plan optimization, invoice management and bill payment. The number of market entries continues to expand, as does the number of regions that have TEM providers, although the majority are still in North America. Global TEM is still a main interest, but it lags behind domestic TEM services in terms of maturity.

User Advice: Many companies are already on their second or more TEM provider. Most report continued value from their TEM experience in relation to management and efficiency, if not dollar savings. TEM continues to provide excellent management capabilities that can help companies identify and control areas of spending. TEM outsourcing has grown as a way to help fill in services that the enterprise no longer has resources to manage. Identify key areas that go beyond the enterprise core competency, and that have growing usage and increasing costs for outsourcing, including global management, policy, procurement and mobile device management. Enterprises need to include fixed and mobile TEM as part of their outsourcing strategies for cellular, data, long distance, Wi-Fi hot spots, dial-up and other remote-access services. Enterprises must create a list of expectations about how TEM will change the way telecom services are sourced and managed regarding key elements, such as expected return on investment, responsibilities and impact on head count. Consider benchmarking current hard and soft costs, to understand the full impact of TEM services.

Business Impact: TEM reduces external network service provider costs and internal service management costs. TEM reduces the costs of telecom services by providing rate plan optimization and invoice management (error reduction dispute management). TEM provides management and resources for service. Although support is just growing, this capability is required to be provided globally to allow a global view of telecom service expenses when needed. In addition, depending on the current level of governance, a continued savings of 10% to 35% of total spending may be achieved, though first-year savings will be higher than concurrent years, with a relative investment of 0.25% to 3% of service spending (the range depends on the amount of the total telecom spending). TEM provides deeper insight into total telecom spending across multiple providers and geographies, and provides better service for procurement.

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Sample Vendors: ProfitLine; Quickcomm; Rivermine; Symphony Services; Tangoe

Recommended Reading: "Magic Quadrant for Telecom Expense Management"

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"Toolkit: Best-Practice Terms and Conditions for TEM Services"

"Toolkit: Telecom Expense Management SLA Guidelines"

Off the Hype Cycle

Java Platform, Micro Edition

Analysis By: William Clark

Definition: Java Platform, Micro Edition (Java ME) is a version of Java designed for use in small devices, such as mobile phones. Java ME is part of the related technologies that include definitions of profiles and configurations for mobile application developers.

Position and Adoption Speed Justification: Java ME has fallen into the Trough of Disillusionment and off the Hype Cycle. Gartner expects future generations of Java technology from vendors to revisit Java ME, but the combination of HTML5, JavaScript and Cascading Style Sheets 3 (CSS3) as a paradigm will dwarf Java ME for developer interest and innovation. Research In Motion, Motorola and Oracle-Sun Microsystems will support Java ME's fragmented technology base; however, the fact that developers must spend more time fine-tuning Java ME-based applications for performance and scalability, compared with native applications, limited the number of enterprises and independent software vendors adopting it. In 2010, interest began to wane, with more attention focused on cross-platform tools for rich Internet applications (RIAs). In 2011, interest is virtually zero, and we are retiring Java ME from the Hype Cycle.

User Advice: Java ME continues to evolve slowly, moving to high-end, connected-device configuration profiles and packages, such as JSR 209 and JSR 280. They are closer to "desktop" Java, and will enable corporations to reuse more-established skills and tools, but they generally use Java ME tactically for lightweight, consumer-facing applications. Explore vendors, including mobile enterprise application platform (MEAP) providers, as alternatives that can address fragmentation and delivery issues.

Business Impact: Java ME's effect on business will be scalability of mobile applications through standardized, OS-neutral application interfaces for wireless devices. Java MEs also promise widespread inclusion by handset vendors. Java ME has enjoyed niche success (in particular, IBM and Oracle continue to rely on Java ME), and Gartner expects it to continue to grow as more line-of-business applications are ported to support smartphones.

Benefit Rating: Low

Market Penetration: 5% to 20% of target audience

Maturity: Legacy

Sample Vendors: IBM; Motorola; Nokia; Oracle; Research In Motion

Recommended Reading: "Guide to Choosing Architectures for B2C Mobile Applications"

"Mobile Architectures, 2009 Through 2012: A Trend Toward Thin"

Mobile Email Services

Analysis By: Monica Basso

Definition: Mobile email services enable individuals to access personal email accounts via mobile networks on mobile devices. They have limited capabilities, but are available across a range of phones. A "push" or a "pull" mechanism is used to deliver email to an offline email client

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running on the device, which can be native or downloaded separately. Alternatively, SMS or Multimedia Messaging Service (MMS) may be used as bearer technologies for exchanging emails. Another way for people to access email on mobile devices is via Wireless Application Protocol or Web browsers to Internet email accounts, such as those offered by Google (Gmail) and Yahoo, possibly through additional widget solutions.

Position and Adoption Speed Justification: Internet and other service providers, handset manufacturers and mobile operators offer wireless email services to their subscribers. Service providers' offerings include Gmail, Yahoo Mail and Microsoft Network (MSN); we estimate that they account for at least 100 million wireless email service users. Handset manufacturers' offerings include Apple's MobileMe (with an estimated 900,000 mobile users) and Nokia's Ovi Mail (approximately 5 million users). Carriers' offerings include Email on the move from H3G (a mobile operator), Orange World from Orange, and Vodafone Email Plus from Vodafone; we estimate that carriers' wireless email service users account for at least 50 million active users. These services are often implemented through white-label platforms, such as Seven, Good, Funambol and Synchronica. Some offerings work with high-end smartphones running Research In Motion (RIM) OS, iOS, Windows Mobile, Pocket PC, Symbian S60 or Palm OSs. Others offer simpler services that reach a wide range of mobile devices, including simple phones. In 2010, Nokia announced a partnership deal that enables Yahoo to offer Ovi Mail and Chat services. In June 2011, Synchronica announced the acquisition of Nokia's Operator-Branded Messaging (OBM) business, formed when Nokia acquired Oz Communications in 2008.

Mobile email is becoming a commodity and will experience mass-market adoption, because most phones support it (via a client or a browser approach). People who are familiar with email and mobile communications are keen to extend the experience to mobile phones. Public email providers, such as Google, Yahoo and MSN, support mobile access from most mobile clients. Usability and price affordability will be important to the adoption of mobile email in the consumer market. The continuous price reductions for smartphones and service bundles, as well as ongoing innovation in smartphones' user interfaces, are driving the market in that direction. One possible obstacle to further adoption of wireless email services is the emergence of competing messaging tools, in particular, mobile social networks and IM, which see growing adoption and will absorb some usage from wireless email. By 2014, social-networking services likely will replace email as the primary vehicle for interpersonal communications for 20% of business users (see "Predicts 2010: Social Software Is an Enterprise Reality").

Wireless email consumer services are often not appropriate for enterprises, because of their limited capabilities, security factors and international support. However, they may be a viable option if cost limitations apply and reduced service levels are acceptable.

User Advice: Users should choose solutions that meet their requirements in terms of usability and cost. "Prosumers" (consumers who are professionals in a given field) and individuals using their personal devices to connect to corporate email services should evaluate the security factors. Companies should ensure that their employees understand the potential threats and available methods to address them.

Mobile carriers should:

- Choose a consumer mobile email application that's easy to install and requires minimal configuration by users. Ensure that all complex configuration tasks can be executed by the carrier over-the-air, freeing the user from this task.

- For email systems operating with Java Platform, Micro Edition (Java ME)-enabled phones, ensure that the phone manufacturer is committed to porting the client application to a wide range of handsets. Arrange for the manufacturer to preinstall the client, which will be more convenient for users.

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- Consider using an MMS-based approach to estimate market demand, rather than to generate substantial revenue.

- Define less-expensive tariffs, based on different user profiles (for example, children, teenagers and women), specific use models and available money.

Vendors should consider integrating presence and IM into email clients. This is the direction in which technology and users are going.

Business Impact: The growth of mobile email for consumers may provide user organizations with new channels for marketing, advertising and online selling — channels that complement the Web and other distribution methods.

Mobile carriers and other network service providers have an opportunity to offer consumer mobile email as part of data service bundles, because consumer demand will keep growing as increasing numbers of traditionally PC-based applications are extended to mobile phones.

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Mature mainstream

Sample Vendors: Critical Path Software; Funambol; Good Technology; Google; Microsoft; Nokia; Seven; Synchronica; Yahoo

Recommended Reading: "Collaboration and the Cloud Will Transform the Wireless E-Mail Market"

"Commoditization Drives the Enterprise Wireless E-Mail Market"

"A Democratization Process Will Bring Wireless E-Mail to the Masses"

Mobile Widgets

Analysis By: Carolina Milanesi; Nick Jones

Definition: Mobile widgets are small, usually simple, applications built using Web technologies such as JavaScript, XML, HTML and style sheets. Widgets are stored on a handset and are executed locally by a widget engine, which may be provided by the mobile browser or as a separate tool. Most widget technologies are available on smartphones; some are available on less-capable, enhanced phones. Widgets are a form of mobile application and, as such, can be downloaded from application stores and other mobile content providers.

Position and Adoption Speed Justification: Widgets are not as capable as native binary applications, but can access Web services and are used to deliver a wide range of simple utilities, such as weather forecasts, ATM finders, social networking and stock tickers. Although standardization work is under way by the World Wide Web Consortium (W3C), there are many incompatible mobile widget technologies and frameworks, including Qualcomm Plaza, Bondi widgets, Opera widgets, Nokia Web Runtime, Yahoo mobile widgets and Access NetFront widgets. Mobile widgets also inherit the restrictions of mobile Web applications, such as the lack of standard ways to access many handset application programming interfaces. We have retired mobile widgets from the Hype Cycle because the technology is becoming absorbed into the wider market for Web and native application development technologies and tools, including HTML5 and the tools that deliver it.

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User Advice: Despite portability challenges, widgets provide a technology that can deliver simple applications to a large number of handsets using well-understood technology. Although fragmentation means that it may be necessary to create several versions of a widget to address a wide range of handsets, mobile developers should consider widgets for simple applications, especially those running on smartphones and accessing Web services.

Business Impact: Widgets have had a high impact. They became one of the most popular technologies to deliver simple mobile applications that are platform-independent. For developers wanting to develop once and deploy to many, widgets were a good tool to do that. However, the enhancements on HTML5 have shortened the opportunity for mobile widgets, making this technology obsolete before it reached the Plateau of Productivity.

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Off the Hype Cycle

Sample Vendors: Nokia; Opera; Qualcomm; Yahoo

Unlicensed Mobile Access

Analysis By: Leif-Olof Wallin

Definition: Unlicensed mobile access (UMA) provides access to Global System for Mobile Communications (GSM) and general packet radio service (GPRS) mobile services, as well as 3G, over unlicensed spectrum technologies, including Bluetooth and 802.11, typically using a broadband connection to "backhaul" traffic to the service provider. In the Third Generation Partnership Project (3GPP) standard, this is referred to as Generic Access Network (GAN). By deploying UMA technology, service providers can enable subscribers to roam and hand over calls between cellular networks and unlicensed wireless networks. UMA also can be used to improve indoor coverage by leveraging wireless LAN, instead of GSM, where cellular coverage is poor.

Position and Adoption Speed Justification: UMA received initial support by a limited number of service providers (e.g., T-Mobile USA, BT and Orange). A limited number of devices and handsets still have UMA support (predominantly from Nokia, Research In Motion [the BlackBerry] and Samsung). North American operators typically regard UMA as a way to improve indoor coverage, while operators in other countries usually promote UMA as a way to offload traffic from mobile networks onto a broadband connection. Femtocells have developed into a competing technology that doesn't require special handsets, which has resulted in UMA remaining a niche technology. Another technology that can replace UMA is voice call continuity with IP Multimedia Subsystem. Softphone clients for IP PBXs (like Cisco) and voice over Internet Protocol (VoIP) clients (like Microsoft OCS/Lync) can also be corporate alternatives. Due to the minimal uptake in the market and many viable alternatives, we've now moved this technology off the Hype Cycle.

User Advice: Device and service providers supporting UMA will offer unpredictable voice quality over unlicensed band services, such as Wi-Fi hot spots or home Wi-Fi networks. UMA was initially targeted for small businesses and consumers.

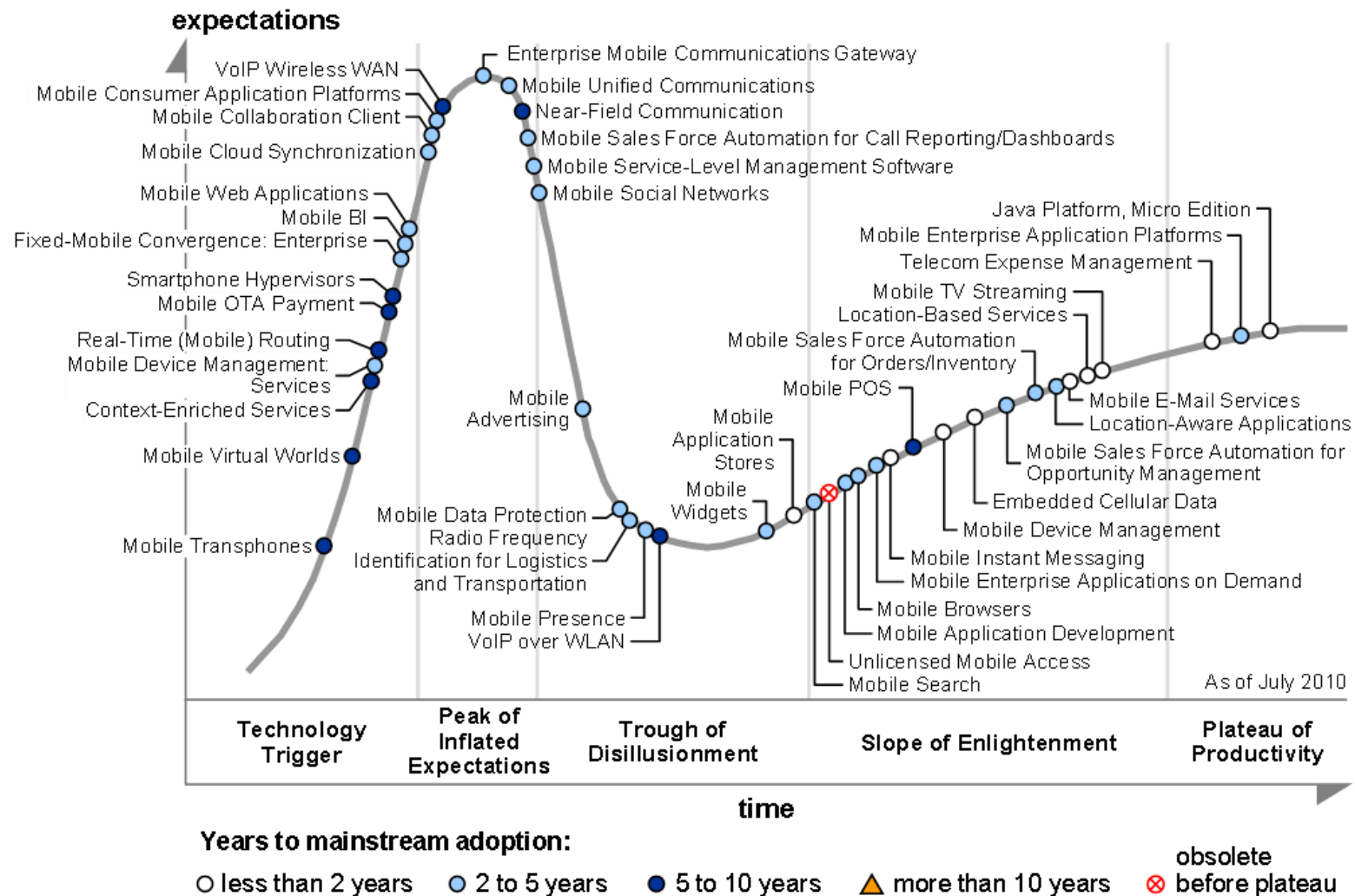*Business Impact:* None

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Adolescent

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Sample Vendors: Kineto; Motorola; Nokia

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Appendixes

Figure 3. Hype Cycle for Wireless Devices, Software and Services, 2010

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Source: Gartner (July 2010)

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Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 1. Hype Cycle Phases

Phase	Definition
Technology Trigger	A breakthrough, public demonstration, product launch or other event generates significant press and industry interest.
Peak of Inflated Expectations	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the technology is pushed to its limits. The only enterprises making money are conference organizers and magazine publishers.
Trough of Disillusionment	Because the technology does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
Slope of Enlightenment	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the technology's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
Plateau of Productivity	The real-world benefits of the technology are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
Years to Mainstream Adoption	The time required for the technology to reach the Plateau of Productivity.

Source: Gartner (August 2011)

Table 2. Benefit Ratings

Benefit Rating	Definition
Transformational	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
High	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
Moderate	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise

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Benefit Rating	Definition
Low	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Table 3. Maturity Levels

Maturity Level	Status	Products/Vendors
Embryonic	• In labs	• None
Emerging	• Commercialization by vendors Pilots and deployments by industry leaders	• First generation High price Much customization
Adolescent	• Maturing technology capabilities and process understanding Uptake beyond early adopters	• Second generation Less customization
Early mainstream	• Proven technology Vendors, technology and adoption rapidly evolving	• Third generation More out of box Methodologies
Mature mainstream	• Robust technology Not much evolution in vendors or technology	• Several dominant vendors
Legacy	• Not appropriate for new developments Cost of migration constrains replacement	• Maintenance revenue focus
Obsolete	• Rarely used	• Used/resale market only

RECOMMENDED READING

Some documents may not be available as part of your current Gartner subscription.

"Understanding Gartner's Hype Cycles, 2011"

"Key Issues for Enterprise Network Services, 2011"

"Cool Vendors in Enterprise Communications and Network Services, 2011"

"Predicts 2011: Network Capacity and Consumers Impact Mobile and Wireless Technologies"

"Predicts 2011: Client-Computing Shifts Continue in Operating Systems, Hardware and Software"

"Key Issues for Unified Communications, 2011"

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