Executive Summary

While globalization, virtual workforces and the pervasive push for anytime, anywhere access continue to drive mobile application development, a more demanding force has gathered momentum: Mobile users who expect rich, personally relevant experiences. These users take advantage of the newest technologies and applications, as well as the sophisticated capabilities of their preferred mobile devices.

As developers struggle to keep up with the ever-changing platforms and devices, they’re spending too much time adapting applications for specific devices and not enough on application development that could deliver a meaningful experience to users and more business value to the enterprise.

This paper reviews the increasing interest in mobile applications, the challenges they create and the approaches companies can take today to accelerate and simplify development and deployment. It also presents how a Mobile Enterprise Application Platform (MEAP) can provide a sound, sustainable strategy for mobilizing applications now and in the future.
**Mobile Application Drivers**

Mobile devices and platforms – from iPhone, Symbian and BlackBerry to Windows Mobile and Android – are being adopted at an accelerated rate. The factors below have made mobile application development a business and competitive necessity for companies wanting to attract the right employees and customers.

**Technology Has Created a Perfect Storm of Opportunity**

Mobile devices are now equipped with faster processors, expanded memory capacity and high-resolution screens.

The maturity, robustness and extended coverage of networks today can deliver fast and virtually seamless connections via high bandwidth to support data-heavy mobile services and applications.

The form factors available – from notebooks and handhelds to smartphones – and the growing sophistication of endpoint solutions – from GPS capabilities, cameras and other peripherals to accelerometers and near-field communications (NFC) technologies – have quickened the mobile application momentum. New entries on the market, such as touch-optimized pads, have also raised the bar on how fun, enticing and productive the mobile experience can be.

**Why now?**

- Consumerization of IT: Demand to access enterprise applications from personal mobile devices
- Mobility and Web 2.0 enabling higher degrees of collaboration
- Push to extend personally relevant experiences to a new breed of mobile workers
- Mobile B2C applications delivering new channels for customer interactions
- Mobile ‘mashups’ can create more meaningful experiences for customers
- Mobile device technologies are ready for enterprise-grade applications

**Rising Expectations of Mobile Workers**

In a world of instant messaging, Twitter and Facebook – and a growing workforce of ‘digital natives’ with high expectations for communication and collaboration – email access is not enough. Mobile workers now want access to enterprise applications from their own, hand-picked mobile devices.

The ‘human factor’ in application development can no longer be downplayed. Before, applications imposed business processes onto users. Now, applications must incorporate the needs of the mobile individuals that participate in that process.

**New Ways to Engage Customers**

Mobile business-to-consumer (B2C) applications allow companies to engage customers in immersive, interactive experiences and to radically change how, where and when those interactions take place. For example, mobile eCommerce applications can open up new revenue opportunities to transact business over the web – from accepting bids in an online auction to paying for a pizza. Highly interactive ads can be embedded into mobile applications to attract attention and build brand recognition within a mobile audience that could scale into the millions.

With the growing popularity of app stores, it’s clear that consumers are willing to pay for mobile applications. The potential is there to recoup development costs by combining those payments with revenue from eCommerce transactions and ad sales.

Mobile B2B applications can also engage customers across the lifecycle: From awareness through acquisition and on-going support to follow-on activities that present cross-selling opportunities and reward loyalty with special offers, gift cards or other promotions. Whether they’re providing eCommerce capabilities, information or just a convenience, each application must deliver relevant experiences to each user to be of value.

**Challenges and Requirements for Development and Deployment**

Today, developers must deal with a groundswell of user demands for more mobile applications. IT wants to move forward with mobilization plans, yet there are many challenges and requirements holding them back.

**Changing Devices and Platforms**

Employees not only want access to enterprise data, they want that access to be delivered via any device of their choosing. Developing applications for the multiple, constantly changing devices and platforms presents time, resource and budget challenges.

Users also expect mobile applications to be tightly integrated with the inherent features of their mobile devices. Yet, many approaches to mobilizing applications fail to enable that integration, which results in a more passive, less rewarding experience.

Varying protocols and a lack of industry standards add to the complexity. Companies may put development efforts on hold or halt them altogether to see which standards emerge as winners, delaying the benefits mobile applications can bring to the enterprise.

**Flipping the Development Ratio**

Today, mobile application developers spend roughly…

- 20 percent of their time on actual application development
- 80 percent of their time on adapting applications for deployment across multiple handsets and networks

Companies must flip that ratio to fully realize the benefits mobile applications can bring.

**Focusing on Deployment, Not Differentiation**

As developers attempt to keep up with change, they’re too focused on adapting applications for specific devices, rather than developing applications that could advance the business. Crunched for time, some deploy short-term solutions, such as using a web-browser for mobile access. These approaches provide mobile access, yet they do little to deliver a true business advantage or to ensure the experience is valuable to end users.
Need for Integration with Disparate Back-End Systems
Users want fast and easy access to information without worrying about where the data resides or logging into multiple systems (Kronos for time-keeping, Siebel for customer data, etc.) with different user names and passwords. To adjust to the way employees work, rather than disrupt it, mobile applications must be able to deliver a composite experience that mirrors the workflow. That takes accessing data from multiple back-end systems.

It’s the same for B2C mobile applications. To attract new customers and build profitable relationships, mobile applications must be able to quickly ‘mash up’ information from disparate sources and deliver that information in a way that’s useful to the customer.

The problem is, many approaches to mobilizing applications today provide no easy way to accomplish this integration. Even when companies do create back-end interfaces for specific mobile applications, they have to re-engineer those same interfaces to work with each new mobile application they develop.

Dealing with Unpredictable Connections
Some mobile application deployment models require a persistent network connection to application servers. When that connection is disrupted due to poor network coverage, weak signals or dropped connections, the application is no longer available and data on the device gets out of sync with application data on back-end systems. Relying on remote connections with application servers also slows response time and decreases battery life, as each request back to the servers must traverse the network.

Mobile solutions must be able to support off-line operations so users can continue to work uninterrupted, even when disconnected. They must also provide an efficient way to store and forward information to mobile devices when the network connection returns, to update data without the need for user intervention.

Meeting Dynamic Demands
The IT infrastructure must be able to expand capacity for growing demands, especially with B2C applications where traffic is harder to predict and availability is so tightly linked with revenue generation and customer satisfaction. The challenge for companies will be finding a balance between under-investing and over-provisioning computing resources to meet the varying demands. One leaves them unprepared for usage spikes, while the other leaves them paying for capacity they may not need or be able to afford.

Management and Security
As mobile adoption increases and workers continue to choose their own devices, IT needs a centralized way to deploy, manage and update the applications and devices, as well as a way to track and report usage and activity. Managing wireless transactions in the mobile environment also poses challenges. While wireless transactions expand when and where employees can accept payments and shorten the order-to-pay cycle, companies must be able to process the transactions, despite fluctuations in bandwidth, network coverage and low battery power on devices.

The mobile environment creates multiple new entry points for malicious attacks. Beyond stolen or corrupted data, service disruptions and regulatory issues, companies must be concerned with putting their brand, reputation and intellectual property at risk. B2C mobile applications add to these challenges. IT must have a way to track all data flows and transactions to comply with strict regulations around how sensitive customer data is accessed, stored and transported to avoid negative publicity, litigation and loss of customer trust.

Typical Approaches to Mobilizing Applications
The push is on to extend applications to the mobile perimeter. The typical approaches to doing so vary widely. Each has its merits and drawbacks, depending upon a company’s business requirements and the user experiences they want to provide.

Here, we discuss the characteristics of three mobile application development and deployment options: Point solutions, browser-based solutions and smart client solutions.

Point Solutions
This model mobilizes one application to one type of device or platform. It works for companies that want to mobilize a specific application for a current need and that are less concerned about extending the application to additional devices or platforms.

Decouple the mobile application from the device to get more mileage out of development efforts.

However, with devices and platforms changing approximately every six months, developers must re-engineer the application to take advantage of the updates, or get stuck in older technology. Further, if the need arises to extend the application, developers must go back to ‘square one,’ since the application is hard-coded and tightly coupled with each device or platform on which it runs. For example, an application written for an iPhone would require an entirely new development effort to run on a BlackBerry.

The Point solutions approach typically gives mobile users access to only one or two back-end applications. The user experience this approach provides is also rather ‘flat,’ since interactions with the applications mainly consist of filling in pre-defined fields.

Browser-Based Solutions
This approach mobilizes applications using a web browser and can be an easy way to extend existing applications. To access the application, users launch the browser on their mobile device the same way they do on their desktop, without the need to learn a new application.

Typical Approaches to Mobilizing Applications
- Point solutions develop and mobilize one application to one type of device or platform
- Browser-based solutions mobilize applications using a web browser
- Smart client solutions develop and mobilize applications using native device language and smart client technology
With no need to develop, install and manage applications for each specific device and platform, this model can deliver substantial time and cost savings. There’s also no need to push updates out to devices, just update the website.

**Employees expect to use the unique features of the mobile devices they buy.**

There are some downsides to browser-based solutions. Although they successfully decouple an application from specific devices and platforms, the applications are still tightly coupled with specific browsers and browser versions. Developers must make sure the user interface works with multiple browsers and updated versions of those browsers. If not, some features of the application may not work and the content could be displayed differently, depending on the browser used.

Device form factor becomes a big issue: Web page content meant to be rendered on a larger desktop or laptop screen, could be cluttered and hard to navigate on smartphones or PDAs. However, the most significant hindrance to a positive user experience may be that browser-based applications fail to take advantage of the unique, rich feature sets of each device. Further, since users are dependent on network connections to remote servers to work, response times are slow. They also must access multiple back-end systems separately for information.

Browser-based solutions also deliver a relatively passive experience for B2C applications: Nothing happens unless the user opens the browser. Companies are missing the opportunity to create fully immersive and interactive experiences for customers.

**Smart Client Solutions**

In this model, developers use downloadable development kits provided by device manufacturers to write mobile applications using the device’s native language. This enables the application to be tightly integrated with that device’s APIs and unique features, such as a barcode scanner, GPS or camera, and other device-resident applications, such as email, address books or calendars. Smart client solutions also allow developers to create more robust, highly interactive enterprise and B2C applications to improve the employee and customer experience.

**Shift focus from keeping up with devices to delivering value to employees and customers.**

Instead of being accessed over the Internet, mobile applications reside locally on smart client devices. Since smart clients store data locally, only periodic network connections are needed. Users can continue to work offline and receive automatic updates when reconnected to a network. Smart clients also run applications that would be too bandwidth-intensive if delivered via a browser. Limiting transmissions between devices and servers increases battery life while decreasing bandwidth and server requirements, freeing these expensive resources for other applications.

There are disadvantages. With very little portability across mobile devices and platforms, native client applications require developers to build and update multiple versions of the same application. Different skill sets are needed for the different native languages of each device. These languages evolve quickly, putting developers in a constant state of re-learning and repetitive development cycles.

Further, while native client applications provide a richer user experience, that experience is still too disruptive to the workflow, as users still need to access each back-end system separately. With no consistent way to control and protect data, management and security also remain critical issues.

**Mobile Enterprise Application Platforms: Developing for Value**

“Today’s mobile technologies allow enterprises to transform their business models by applying wireless capabilities to mobilize their applications and business processes – creating competitive advantage, positive ROI and rich experiences for employees and customers alike. MEAP platforms are a key element in these new mobile enterprise architectures.”

– Michael Antieri, President, Advanced Enterprise Mobility Solutions, AT&T

Mobile Enterprise Application Platforms (MEAPs) accelerate and simplify the development, deployment and management of smart-client-based mobile applications. They provide a set of tools and an associated run-time infrastructure to connect mobile workers to a variety of back-end sources in a device- and network-agnostic way.

Mobile Enterprise Application Platforms (MEAPs) foster an ‘any application to any device’ strategy that bring together five key elements – devices, mobile middleware, management tools, a development environment and an integration framework. Together, they interoperate with each other and the existing infrastructure for seamless mobile connections and communication. By bringing these benefits to mobile application development and deployment, MEAPs allow companies to successfully address many of the challenges they face today.

**Freedom to Focus on Business Value**

With a multichannel development approach that supports a variety of device types and platforms, MEAPs can eliminate the repetitive, resource-intensive tasks involved in building and deploying mobile applications. This enables companies to successfully flip the application development ratio, so they can spend less time on adapting applications for specific devices. Instead, they can focus efforts on developing mobile applications that deliver value to the business and a relevant, engaging experience to users.
Developers can also concentrate on building powerful business logic layers and rich interfaces that adapt to different user needs. That’s where the added value to users comes in: MEAPs give developers the flexibility to support different workflows within the application, rather than dictating what those workflows will be.

**Faster, Lower-Cost Development**
MEAP solutions provide an end-to-end development environment for designing, building and testing mobile applications across multiple devices and platforms. MEAP platforms leverage popular open source IDEs (integrated development environments), such as Visual Studio, Eclipse and NetBeans. They also take advantage of standards-based technology, such as WSDL (Web Services Description Language), XSD (XML Schema Definition) and SOAP (Simple Object Access Protocol).

This flexible environment is important for companies that want to hasten development while lowering costs, because it allows developers to apply existing expertise and skill sets. To simplify development further, MEAPs also include templates and base-line applications, as well as tools to develop, test, and debug an application on a device emulator, which significantly speeds up development and testing.

This ‘write once, deploy to many’ model uses reusable components to free developers from writing code for each device. They can write applications once and run them on a range of mobile devices, platforms and networks. Support for multiple languages and currencies are also built into the MEAP platform and development environment.

**Rich Feature Integration**
Applications developed in a MEAP environment allow users to take advantage of the unique features and capabilities of their chosen mobile devices, as well as peripherals, such as magnetic strip readers for credit cards, barcode scanners and printers.

**Robust Connectivity with Back-End Systems**
Mobile middleware is at the heart of the MEAP architecture. Acting as a traffic cop for bi-directional communication between back-end systems and mobile devices, this is where the core wireless message transformation takes place, as well as transaction routing functions.

There’s no need for mobile workers to access multiple systems for answers. Using a variety of protocols (HTTP, JDBC, JMS, etc.), MEAP connects with back-end sources to extract, transform and integrate data. It then encrypts the data and sends it back in real-time to the middleware core.

**MEAP middleware does the translation work, not developers.**
That’s where the MEAP multichannel approach comes in, freeing developers from worrying about data flows to specific devices. In MEAP deployments, the middleware does that work: It translates the data so it’s viewable on the device requesting the information and pushes it out to the user.

A MEAP integration framework can include a portfolio of pre-built application adapters for connections with packaged and homegrown solutions running on back-end enterprise systems. This reduces the need to develop connectors from scratch, or to customize existing connectors. MEAPs can support a variety of connector types, including HTTP, web services, JDBC, JMS, file and custom adapters.

Developers can use these capabilities to write one user interface to combine multiple back-end applications into a composite application experience. To users, it looks like the data is coming from just one system.

**Off-line Connection to Business Information**
As smart clients in a MEAP environment, applications can function independently of a central server connection, so users can continue to work off-line. Applications run locally on devices for faster response time, and updates are automatically pushed out when the device reconnects to network.

**Management and Security**
The MEAP management component interfaces with the middleware and key back-end infrastructures to provide IT administrators with a high level of visibility and control over the mobile environment, via a web-based console. Administrators have centralized management of user devices and applications in the mobile environment, so they can install and update software over the air. Centralized policy creation and enforcement guards against unauthorized access and helps to protect data, even if the device is lost or stolen.

The MEAP management component monitors all transactions moving across the mobile network. It gathers data on users, devices, applications and traffic, and generates detailed reports on activity. Administrators can use this intelligence to spot and troubleshoot problems and help ensure that bandwidth and server capacity continue to meet growing user populations as the demand for mobile applications grows.

A large U.S. rail operator uses a MEAP-based mobile application to connect 5,000 mobile workers across the country to a CRM/e-ticketing application at the home office. Ticket takers use barcode-equipped smartphones to quickly scan tickets or online purchase printouts and to process credit card payments on the spot. Real-time data flows to back-end CRM applications for faster visibility into sales revenue.

A leading provider of fire and life-safety systems and services optimizes its field and fleet assets for world-class service delivery with a MEAP solution. Service technicians use smartphones onsite to feed data into field service and fleet management applications on multiple back-end systems. The data integrates with the GPS and wireless data communications on each truck, so the company can track mobile workers and fleet resources for fast, informed dispatching decisions and responsive service.

RFID technology also tracks on-truck inventory and feeds data to back-end systems to ensure technicians have stock on hand for service calls.

A major food manufacturer with nearly 100,000 employees deployed its SharePoint applications on iPhones. When the company acquired another business with the same applications running on BlackBerry devices, they deployed the SharePoint applications on a MEAP platform, which allowed the combined workforces to use their existing devices to share information and collaborate on projects.
Mobilizing Enterprise Applications

For more information contact an AT&T Representative or visit www.att.com/business.

Comparison of Mobile Application Development and Deployment Models

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<th>MEAP Solutions</th>
<th>Point Solutions</th>
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<td>Major Advantage</td>
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Source: June, 2010 interview with Vishy Gopalakrishnan, Director, Mobility Applications at AT&T.

Support for Dynamic Demands and Emerging Technologies

MEAP solutions provide a highly scalable runtime gateway and server infrastructure to support growing numbers of users, devices and applications. Based on an open, flexible architecture, the platform also readies companies for emerging technologies, such as HTML5. This next iteration of the HTML standard is designed to deliver the best of both worlds: the ease of a browser and the richness of native client applications.

Choosing a MEAP Provider

Mobile applications will continue to grow in popularity, and the diverse nature of the mobile environment will continue to add to their complexity. To avoid developer burn out, costly ‘do overs’ and user disappointment, businesses need a strategic, sustainable approach for moving forward.

With many MEAP providers to choose from, companies should consider choosing a service provider who can offer full mobile application lifecycle support – from planning and development to deployment, hosting, management and optimizing mobile applications – to accelerate and simplify rollouts.

Given the dynamic needs of mobile applications, the MEAP provider should offer a range of enterprise hosting and management options, based on a robust technology platform, to help ensure applications meet user expectations for high availability and anytime, anywhere access.

To reduce complexity further, companies should consider working with a single MEAP provider. The provider should have proven experience in mobilizing applications to help companies get the most value from their mobile application investments – while taking advantage of the perfect storm of opportunities they provide.

Why AT&T

Proven capabilities
- Full mobile application lifecycle expertise, including application management and hosting to meet dynamic needs
- Experience in delivering enterprise-grade mobile applications to some of the world’s leading companies

Robust technology platform
- A leading mobile carrier with the largest voice and data network in the U.S.
- Combined power of the AT&T global network, enterprise-class Internet Data Centers and the latest security solutions
- Support for emerging HTML5 technologies

Reduced complexity and risk
- A single-source MEAP provider with a single contract and bill from AT&T
- Commercial strength of AT&T to lessen risk

For more information contact an AT&T Representative or visit www.att.com/business.