



Creating High Value Data Services

**WebSphere Micro Environment
WebSphere Studio Device Developer
Version 5.0 Update - Draft**

IBM Pervasive Computing Division

Introduction

There is an overwhelming emergence of small, convenient devices that combine cellular communications with compelling content. In Hand devices such as cellular telephones, smart phones, Personal Digital Assistants and hand held computers all have games, entertainment and personal productivity applications such as Personal Information Management (PIM) Applications including contacts, calendars and to-do lists. This paper outlines IBM's strategy for delivering higher value data services on these same devices.

The next generation of data services is at hand. Creating demand for new high-value data services to drive up Average Revenue Per Unit (ARPU) on connected devices is the major objective of every carrier and service provider. To provide these new high-value data services, carriers and Original Device Manufacturers (ODMs) are focussed on the following three areas. How the device *interacts* with the user. How the device can be used as to *transact* in a business sense. Finally, how the device can *connect* to other systems

IBM's strategy in the In Hand segment is to use open industry standards to combine the power of WebSphere® and the portability of Java™ technology with the convenience of cellular telephones, smart phones, PDAs. By enabling these devices to interact, transact and connect to existing IT applications running major businesses today, IBM. This will allow the creation of higher-value data services for carriers to host, provision and maintain to an increasingly discriminating subscriber customer set. By enabling these higher-value data services, ODMs can also differentiate their offerings to the carriers.

To address the need for higher-value data services, IBM has created the WebSphere Everyplace Foundation. This architected collection of integrated products allows service providers to host new compelling data services that enhance the end-user interaction, transact with business systems and connect to existing applications running in e-businesses all over the world; driving increased connection and increased downloading of new data services.

Figure 1 WebSphere Everyplace Foundation

By combining the power of WebSphere, with the portability of Java technology, IBM delivers the convenience of low cost, mobile and pervasive devices to e-business. Through the integration of software from device platforms to middleware and through to the server and server applications over varying types and capabilities of wireless networks, IBM has delivered a platform where carriers and service providers can easily create, deploy and manage this new generation of data services. IBM provides a tested and proven middleware offering allowing carriers and service providers to focus on applications that differentiate their services and for their customers and improve the user experience.

The Foundation is not monolithic. The architecture of the products is modular in nature. The power of open standards is revealed. Not all components need be selected. Vendors can select what they need and are free to substitute alternate technologies as they see fit. Since the Foundation is based on open and industry standards, other systems can also be integrated quite quickly. Several IBM business associates have already produced value-added components such as Bluetooth, MPEG encoders / decoders, Relational Database, Jini, Secure Socket Layer (SSL) and many other solutions tested on the Foundation. The architecture is also scalable and extensible and allowing for quick addition of extensions for individual carriers.

Interact

As applications are extended to mobile devices, new technologies will be required to provide productivity to the end-user while shielding them from the inherent complexities of integrating local and remote services. Local services such as barcode scanning, displaying scalable vector graphics running full-motion video and voice navigation will be required on the device. Remote services, residing within the service infrastructure, such as location (GPS), transcoding and messaging services will need to be accessed wirelessly by the device. The merging of local services with remote services allows complete flexibility for carrier running the full range from 'always on' to 'available for download'.

By allowing human machine interaction (HMI) using various types of inputs such as speech recognition and text-to-speech, IBM *embedded ViaVoice™* enables a new, rich multi-modal end-user experience. Using device-based or server-based speech engines, voice navigation, command and control or text-to-speech technologies, devices can become an extension of the user, even if the user has no direct access to a browser or other application.

Name recognition allows for hands free dialing. Dialers and command control features allow users to navigate through device and application functions using voice commands. IBM's Via Voice solutions are sensitive to the processing power and memory limitations of in hand devices and offer a full range of on device, and device to server voice functions.

For multi-media interaction with an end user, various technologies can also be used. Through the use of streaming video, MPEG4, and scalable vector graphics (SVG) images can be shown on small devices.

Transact

IBM *WebSphere Micro Environment* provides the underpinning platform for the deployment of e-business applications to small mobile devices. This is known, in e-business terms, as infrastructure.

Supporting a variety of processors (ARM, StrongArm, Xscale, MIPS, PowerPC and others), and popular operating environments (OSE, BREW, Linux, Rex, QNX, PocketPC, and PalmOS to name a few), WebSphere Micro Environment contains a production-ready Java Powered™ runtime environment for all in hand devices; and a whole lot more. This environment has been tested and certified to meet the J2ME™ specifications (CLDC, MIDP, CDC, and Foundation) as specified by the Java Community ProcessSM.

IBM's value is to combine certified J2ME compatibility with middleware and data integration to provide a complete platform for extending e-business applications onto millions of devices connecting to backend systems worldwide.

Middleware allows the device to seamlessly manage the challenges of intermittent connectivity that occur in today wireless world. A handheld device, taken out of range, or a PDA taken deep into a warehouse while taking inventory, are no longer rendered inoperable. Data can be stored locally on the device in using DB2e® or other JDBC compliant relational databases. The data can be synchronized, as a connection becomes available using JMS or MQe. The use of assured messaging lets service providers explore the application possibilities for semi-connected devices despite the connectivity challenge without the need for user intervention.

By combining data, transactions, applications, and middleware, WebSphere Micro Environment delivers a platform for applications ranging from Personal Information Management (contact lists, schedules, browsing, SMS) to extensions of corporate IT applications and beyond to B2C e-business transactions. It also expands PIM applications to link and to extend existing e-business applications (data, transactions and applications) onto wireless devices, creating a new class of applications known as Enterprise Information Management (EIM).

Connect

As new higher-value data services are created, they need a server on which they can be hosted, maintained and controlled. IBM WebSphere Application Server offers a world-class infrastructure for the next chapter in open e-business platforms. As the foundation of the WebSphere software platform, WebSphere Application Server provides a rich, e-business application deployment environment with a complete set of application services including capabilities for transaction management, security, clustering, performance, availability, connectivity and scalability.

Improve time-to-value by building new integration-ready applications that leverage existing enterprise data services. Services such as access to relational databases, transactions, ERP systems and CRM systems, as well as, B2B and B2C solutions. WebSphere Application Server provides a scalable infrastructure to meet the growing workload generated by Web-enabled applications. New implementations of open standards for J2EE and for Web Services combine to create a powerful integrating platform and an "OS-like" network-aware foundation offering profound improvements in productivity.

Manage

Carriers and service providers understand the seriousness of putting an application in production. The application will be deployed to millions of devices, and will need to be updated on a regular periodic basis. Subscribers will also want the ability to add, discontinue or modify their service offerings, without the need for a visit to the carrier or service center. Applications need to be provisioned and maintained over-the-air (OTA or OAP).

At the request of a major carrier, IBM has implemented a set of carrier specific OTA extensions to the MIDP profile, allowing applications to be provisioned. It provides carriers with the ability to control the flow of the application deployed to the handset. Both originating and terminating Universal Resource Indicators (URIs) can be placed onto handsets, so that applications are invoked from the carriers portal, and return to the carriers portal upon completion. The OTA extensions also add support for Muglets and additional multi-media features on the handset (tone settings, vibrations,...).

For larger devices (utilizing Foundation / Personal J2ME profiles), IBM supports the Open Services Gateway initiative (OSGi). OSGi is an open standards group, committed to the over the air provisioning and maintenance of software. The OSGi framework works on bundles of software functions (classes, files,...) that can be pushed to, or pulled from, the device.

Bundles also contain a manifest list of all prerequisite and corequisite bundles that are needed for the application to function properly on the device. The manifest lists can be resolved (checked) before they are downloaded, to determine if the application can be started. Only resolved applications can be started. In some case resolution will include the provisioning of prerequisite or corequisite bundles to the device.

Bundles that are not active can also be removed from the device, or replaced on the device with new functions. In this way bundles can be provisioned to devices, updated on devices and removed from devices. Complete application life cycle management – all transparent to the service provider's customers.

IBM was the pioneer in the Component Distribution System (CDS), and extension of OSGi for device provisioning and maintenance. Elements of the existing CDS system supported by WebSphere Micro

Environment will be introduced into the future versions of the OSGi specification. Customers investing in CDS will have a jump on the market.

Tools

Tools are a very important part of the solution for the development, testing, deployment and maintenance of total solutions. IBM brings consistency across many tools to leverage the skills of programmers across the typical chasms of device and server application development. Bringing the Internet programming to these solutions allowing programmers to focus on solutions rather than bits and bytes.

IBM has introduced WebSphere Studio Device Developer, the evolution of its award winning Visual Age Micro Edition embedded Java Development Environment, by building on top of the widely supported Eclipse open tools platform. The eclipse platform provides a plug-in architecture and serves as the platform for other IBM product including WebSphere Application Developer. WebSphere Studio Device Developer provides developers with a complete build, deploy and test environment for the creation of Java applications that target WebSphere Micro Environment. As part of the WebSphere Studio family of products, it allows developers to build, test, deploy and maintain end-to-end applications. These applications can communicate and interact with J2EE applications developed using its sister product WebSphere Application Developer, which is also built upon IBM's WebSphere Studio Workbench.

Putting it all together

End-to-end e-business does not happen in a vacuum. Existing enterprise databases can provide millions of users with up to the minute information, on demand or transparently based on current business needs. Existing banking applications provide financial services through thousands of ATMs simultaneously. More than a stand-alone virtual machine, it takes integrated servers, middleware, device software to create end-to-end e-business solutions. Supporting the foundation it also takes education, business associates, system integrators and a development community.

By extending enterprise applications to cellular handsets and smart phones, carriers have a means of accessing enterprise data, transactions and applications to offer new, more sophisticated Data Services to their corporate and professional subscribers. Information Technology (IT) also has a means of extending existing e-business applications to mobile, wireless and pervasive devices.

IBM WebSphere Everyplace Foundation provides the platform for the deployment of e-business applications to small mobile devices. By using open standards to combine the portability of Java™ technology with the power of WebSphere, IBM delivers the convenience of mobile devices to e-business.

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