



**The power of WebSphere – The convenience of devices.**

**Embedded ViaVoice  
WebSphere Micro Environment  
WebSphere Studio Device Developer  
WebSphere Application Server**

**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 current strategy for extending e-business applications to these devices.

The next generation of e-business applications is at hand. By extending existing e-business applications enterprises can take advantage of the convenience of mobile devices and capitalize on the low cost of these devices as well. To build these new e-business applications enterprises 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, and PDAs. IBM is providing a complete device to services platform, enabling these devices to optimize the interaction and connectivity to existing IT applications running major businesses today. Extending e-business to millions of devices.

To address this need IBM has created the WebSphere Everyplace Foundation. This architected collection of integrated products allow enterprises to build, test and deploy new compelling device applications that enhance the end-user interaction, transact with business systems and connect to existing applications running in e-businesses all over the world.

### Figure 1 WebSphere Everyplace Foundation

By combining the power of WebSphere, with the portability of Java technology, IBM can deliver 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 (802.11b, Bluetooth, Carrier), IBM has delivered a platform where enterprises can easily create, deploy and manage this new generation of applications. IBM provides a tested and proven middleware offering where developers focus on features which differentiate their services to 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. Developers 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, 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 new technologies.

## 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 can allow complete flexibility for developer 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.

Voice 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 Process<sup>SM</sup>.

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 can allow 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 device e-business applications 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 can often 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 that can offer profound improvements in productivity.

As devices connect through portals to WebSphere, IBM WebSphere everyplace Access can assist with an infrastructure that embraces devices and delivers connectivity through a portal to back end e-business systems. Providing individualized services to users that are sensitive to their device connectivity (desktop, mobile phone, PDA,...). Also for carriers and service providers, the IBM Service Provider Delivery Environment is an offering that allows carriers, service providers and enterprise I/T shops to form the partnerships they need to deliver higher-value data services.

## Manage

Enterprise developers 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. System administrators will need the ability to add, discontinue or modify the applications deployed to devices, 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).

IBM supports the Open Services Gateway initiative (OSGi) through the IBM System Management Framework (SMF) product. 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. The IBM Services Management Framework (SMF) is a product that provides device management software.

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 System Management Framework was a pioneer in the extension of OSGi for device provisioning and maintenance. The IBM SMF Bundle Developer Tool that integrates into WebSphere Studio Device Developer can assist developers in the creation, deployment and maintenance of device software.

## 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 newest member of its award winning WebSphere Studio family of application development products. 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 products WebSphere Application Developer and WebSphere Studio Site Developer, which are also built upon IBM's WebSphere Studio Workbench and integrate using the eclipse.org extensible architecture.

## 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, end users have a means of accessing enterprise data, transactions and applications. Service Providers and carriers can also utilize this Foundation for wireless data services.

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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