



**Workplace Client Technology,
Micro Edition:
On demand infrastructure for devices.**

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Introduction: A billion mobile connections—and counting

The global demand for access to information anytime, anywhere is exploding. Already there are one billion mobile connections in the world today¹, and the number is growing rapidly. According to researcher IDC, mobile handhelds are dwarfing the sales of PCs by a ratio of nearly 4 to 1².

What we call ‘pervasive computing’ doesn’t stop at the integration of new kinds of end-user access devices such as popular personal digital assistants (PDAs), cell phones, smart phones, palmtops, laptops, desktop computers and mobile multimedia systems. Pervasive computing means those millions of people have access to the information they want, when they want it and where they need it.

There are strong indications that the future will hold a trillion or more connected ‘things.’ These things are tiny devices that many people still don’t think of as computers but which have computing power and storage. Pervasive computing can make appliances smart, give pacemakers Internet addresses, provide homes with automation controllers, and enable vehicles with embedded diagnostic and voice control systems.

These devices will deliver new high-value data services to consumers and professionals. Consider:

- Servers that can provision, update and remove software to and from devices, without the need for end-user interaction
- Secure wireless payment terminals that enable employees to carry less cash
- Wireless PDAs that save time by delivering real-time scheduling changes to affected construction workers
- An automobile that informs the driver exactly what is wrong with the car and then suggests pulling over to the side of the road
- The plant control system that alerts and directs a technician to fix a valve in an oil refinery, thereby reducing downtime
- Home automation systems that can save homeowners money by delaying electrical appliance startup until off-peak hours
- Devices that utilize these higher-value data services can help people discover fresh ways of communicating while living in their homes, conducting business, taking care of their vehicles and enjoying life.

In these and many other ways, now and in the future, IBM WebSphere® Client Technology, Micro Edition provides an open, secure unifying platform for extending business processes out to pervasive devices ‘on demand.’

The challenge

The challenge lies in delivering these higher value data services across this spectrum of devices and making them work together seamlessly, accessing many different applications, across multiple networks and locations. Complicating matters have been proprietary technology and a lack of standardization. All these things have hindered progress on the technical front – and subsequently, limited the business opportunity.

To resolve these issues, what has been needed is non-proprietary, industry standards-based component architecture, enabling a viable model for the delivery of network content and services in a scalable manner. At the same time, this architecture needs to enable software updates on a device, which can increase the lifespan and usefulness to the user. Finally, the architecture must assure device integrity for data, transactions and applications.

In this way, people can approach devices with the same trust they put into automated teller machines (ATMs). To provide this trust, a software platform must provide the same integrity that millions of ATM users rely upon each day.

High-value data services on pervasive devices

IBM is now driving the next evolution forward for network-centric computing. Workplace Client Technology, Micro Edition provides an open, secure unifying platform for deploying high-value data services on mobile devices to enable and extend the on demand enterprise.

Workplace Client Technology, Micro Edition is an architected portfolio of products that uses industry standards and middleware to combine the convenience of mobile devices with the solid foundation of IBM solutions to provide security, flexibility and manageability. Customers are already relying on the platform today to deliver mobile field force automation solutions, factory floor control systems and mobile customer relationship management systems. It’s the industry’s leading open, integrated, end-to-end solution for extending e-business to pervasive devices.

The platform is designed to assist device manufacturers, service providers, enterprise information technology (IT) organizations and independent software vendors (ISVs) in forming a wireless ecosystem where any device has access to any service across any network (cellular or enterprise) on any server. For manufacturers and service providers and enterprises alike, the IBM pervasive platform creates a vast new market for extending the enterprise – globally, and in real time.

For device manufacturers, Workplace Client Technology enables them to focus on core skills by providing them with a platform that is pre-enabled for these higher value data services. Manufacturers can differentiate their devices by expanding beyond gaming and ring-tones with a platform that can enable higher-value functions (i.e., news, weather, sports and financial information) and connect mobile professionals to the critical data they need to remain productive, wherever they are. Leveraging industry standards and middleware can allow original device manufacturers (ODMs) to drive revenues by quickly integrating new and compelling functions into their devices to address a wider, more discriminating market. IBM and its business partner network work in conjunction with ODMs to enable high-value data services.

For service providers, Workplace Client Technology can expand the services they offer to their customers. Middleware can facilitate access to information that people want, when they need it. By hosting high-value data services on their networks, service providers can create new revenue generation opportunities, based on content that already exists throughout the net and on corporate Web sites worldwide. For example, Web services can enable access to news, weather, sports and financial information on content servers that currently are accessed through desktop systems. The Workplace Client Technology platform offers an opportunity to increase revenues primarily by expanding the services they can provide to their customers.

The platform also enables software on devices to be dynamically updated and maintained, which can prolong the usefulness of the device. To reduce maintenance costs, new features, functions and software fixes can be provisioned, over the air, while the device is being used. Devices can be customized with applications and services at the point of sale or afterwards without requiring customer intervention. The device platform itself can also be managed and serviced through the network, increasing appeal while

reducing user complexity. In this way, a single hardware device can be differentiated into a number of different models, minimizing the footprint and cost for low-end devices, and enabling new productivity features to be downloaded over-the-air. IBM works with carriers and service providers to facilitate the partnerships needed to host secure high-value data services.

For enterprises, it's the opportunity to extend existing business applications and resources to low-cost pervasive devices, such as workforce mobility applications, where employees and business partners can share information with existing billing and plant floor control systems. Today, mobile workforces are using a diverse array of devices to meet their individual needs. IBM combines device software with middleware and server integration, delivering a complete end-to-end software-to-services offering. Moreover, IBM and its Business Partners provide seamless integration with legacy enterprise applications, allowing extension of e-business models and unfailing integrity – anytime, anyplace.

For integrators and ISVs, Workplace Client Technology is more than a device-centric platform. Offerings are optimized for end-to-end solutions and oriented toward server-to-device connectivity, services delivery and management. It enables you – as an integrator – to respond quickly to changing market realities and consumer demand. How? The platform uses industry standards and middleware to provide you with a comprehensive set of component products and tools to fulfill your embedded device software development needs. Device integrators simply choose the building blocks they need to differentiate their offerings in the marketplace. All components have been pre-integrated and pre-tested to work together at optimal levels. The programming model is such that new and compelling content can easily be created, while existing enterprise content can quickly be extended onto pervasive devices.

The entire wireless ecosystem will appreciate the life-cycle management features that make software updates transparent to the end user and support the evolution of the software – thereby, extending application life-cycles. The Java™-based run-time environment enables a wide variety of applications and opens the device to a vast developer community. The ability to integrate existing enterprise services or vendor-provided services seamlessly makes it

easy to add new services at any time. Content that is created using industry standard markup languages can be used for all present and future devices.

Workplace Client Technology, Micro Edition: Platform for growth

Workplace Client Technology, Micro Edition uses industry standards and middleware to combine the convenience of pervasive devices with the power of e-business and the productivity of IBM Workplace. Several elements can be applied to a wide array of device types, including desktop computers, laptop computers, mobile handsets, PDAs, controllers, gateways, set-top boxes and others to deliver the right combination of productivity and integrity required for a specific application.

Customers can quickly select the data services that enhance the productivity of end users. IBM and its business partners are ready to assist you in the development of pilot applications and services for any new and existing device, as well as offering the end-to-end device to services expertise that can deliver integrity to the device.

Application Services

Workplace Client Technology, Micro Edition provides the foundation for the deployment of high-value data services to small mobile devices. It contains a production-ready Java Powered run-time environment, tested and certified to meet the Java 2 Micro Edition (J2ME™) specifications. What distinguishes Workplace Client Technology, Micro Edition from the competition is the use of industry standards and middleware that can enable the device for high-value data services, such as:

Client Management Services

- Operating Systems Support for many of the most popular devices is provided within the Workplace Client Technology by WebSphere Everyplace Micro Environment. WebSphere Everyplace Micro Environment provides a J2ME Java Powered runtime environment, and a whole lot more. For small devices such as cellular telephones, smart phones and PDAs, WebSphere Everyplace Micro Environment delivers a JRE that meets Connected Limited Device Configuration (CLDC) and Mobile Information Device Profile (MIDP 2.0) specifications. For larger devices such as PDAs, PDA phones and handheld computers, WebSphere Everyplace Micro Environment ships the Connected Device Configuration (CDC), Foundation Profile and Personal Profile. Workplace Client Technology,

Micro Edition also provides the ability to use custom profiles for applications where footprint and performance are of the most importance.

- Security Services are also supported to provide data encryption and decryption, as well as authentication and authorization.
- Platform Management Services enable the management of the underlying platform as well as provide dynamic application and service downloads remotely and can be initiated by the user or server for push and pull support.

Interaction and Access Services

- Data services that enable a device to coordinate applications and data with another system (from the users PC, the carriers' portal, or an enterprise I/T server). This also includes providing Web Services support that can allow content, hosted throughout the network (news, weather, sports, finance and others) to be easily accessed from pervasive devices.
- Messaging and Communication Services to provide instant connectivity to other people throughout the network and can enable mobile professionals to remain in contact with their colleagues. Inter-application and service communications is also supported to facilitate sharing of information and control events.
- Session Services provide for the user and network sessions management, supporting managed, secure and personalized access and control of information and data independent of the network connectivity.

Workflow and Logic Services provide for the implementation of core business logic and management of workflow as part of the overall solution.

Workplace Client Technology, Micro Edition is the follow-on product to WebSphere Micro Environment. In the cellular and PDA arena, this technology is already used today to power PalmOne devices such as the Treo line of PDA phones and the Tungsten line of PDAs. It is also used in Varco Ampheon line of robotic controllers used for offshore oil drilling.

Rational Data Services

IBM DB2® Everyplace® (DB2e) provides data management services on embedded devices. It provides the means of storing information locally on a device, and forwarding it to server based systems. Using open standards and technologies such as Java and Extensible Markup Language (XML), DB2

Everyplace supports all major mobile platforms and works well within existing corporate IT infrastructure. The 200-kilobyte DB2 Everyplace database has industry leading indexing and query performance. DB2e provides the middleware to ensure data integrity to the increasing number of mobile employees that need to obtain and update enterprise data (inventory control, sales data, asset monitoring) via pervasive devices. DB2e, in conjunction with Workplace Client Technology, Micro Edition, is already used by AirTools to notify residential construction workers on changes in schedules in real-time.

Transaction Services

For transaction services, IBM WebSphere MQ Everyplace (MQe) provides the ability to integrate devices to assured messaging systems, business integration systems and financial transaction systems worldwide. MQe enables messages and transactions to be queued up on the device for delivery as the device obtains a connection to a server. This is important for semi-connected devices where financial transactions, medical information or other critical data must be forwarded once, and only once, to a server. MQe also provides the infrastructure for factory floor edge-of-network devices to interact with supervisory control and data acquisition (SCADA) systems. MQe supports a wide range of devices with a small, customizable footprint and offers a choice of languages, application program interfaces (APIs), and environments including Java, C, Java Message Service (JMS) and J2ME. MQe, in conjunction with Workplace Client Technology, Micro Edition, is already used on the Banksys CZAM/SMASH wireless payment system to provide secure wireless financial transactions.

Provisional Services

IBM Service Management Framework is an implementation of the Open Services Gateway Initiative (OSGi) Service Platform specification and provides for the provisioning (network delivery and management) of applications and services – independent of device operating system and instruction set architecture (ISA). Service Management Framework provides the ability to install, start, stop, update and uninstall applications (bundles of software) without affecting other applications executing on the device. This provides the fundamental underpinnings for pervasive e-business on demand – enabling new applications and services to be added or updated on your networked device dynamically. Applications can either be pushed to devices by service providers or network administrators, or pulled to devices by end users.

Platform Services

Software development teams are always creating new and compelling functions to keep their customers informed, entertained and productive. Devices can last for years, but software is continually updated. To meet this challenge, IBM provides Extension Services for WebSphere Everyplace, a set of extensions that integrates with Workplace Client Technology, Micro Edition to enable the deployment and management of run times, middleware and applications to pervasive devices.

Extension Services for WebSphere Everyplace exposes a set of APIs that can assist developers in the creation, testing and deployment of server-managed software to semi-connected devices. These APIs include:

- Platform Management Extensions enable software bundles to be provisioned to, updated, maintained and withdrawn from pervasive devices. This service is enabled by the IBM Service Management Framework product.
- Systems Management Extensions enable system administrators to monitor and control the loads of software on specific devices. Network administrators can customize software loads for individuals or groups of individuals, such as a sales force. This service is provided by the Tivoli Device Management Agent.
- Enterprise Extensions leverages the enterprise developer community by utilizing the same Java 2 Enterprise Edition (J2EE™) programming model for application development. Embedded servlets and embedded Java Server Pages (eJSPs) can enable local device browsers for rendering content, without the need of server connectivity. Embedded Web services enable business integration and the expansion of applications running on enterprise servers to be easily accessed from wireless and wireline devices. In addition, user interface APIs can enable developers to deploy full function, rich client user interfaces to devices, avoiding the network latency of constantly going back to a server. Available on both J2SE and J2ME platforms, Extension Services provides the platform integrity needed by enterprise IT organizations to extend existing applications to server-managed client devices.

Extension Services for WebSphere Everyplace is already used by Blue Martini Software for field force automation in their customer relationship management software. Nissay Insurance also uses the technology to extend their adjustor program out to semi-connected desktop and laptop computers.

Over time, IBM will also enable its device products for extension services. Lotus Workplace, DB2e, MQe, and J2ME Web services will all utilize this function to deliver deployable, maintainable software on pervasive devices.

The device may not always be on, but it has to deliver transactional, data and application integrity across wireless and wireline networks. The architecture delivers the platform integrity needed so that devices that are connected, disconnected or intermittently connected can access high-value data services.

Human Machine Interface Services

IBM Embedded ViaVoice® software represents a dramatic shift in the evolution of embedded speech products, bringing integrated voice recognition and text-to-speech down onto the mobile device. It provides a low-cost voice solution that uses low resources on the client device and delivers high-accuracy speech recognition.

The flagship of the family, ViaVoice Enterprise Edition, has the capacity for an unlimited active vocabulary and a dynamic and swappable word phonetic list feature that enables embedded applications to access voice-enabled databases with millions of records. A typical application would be a voice-enabled navigation database of street names for a Global Positioning System (GPS) in your automobile.

Another Embedded ViaVoice product is the Mobility Suite, which allows you to operate common personal information management (PIM) functions with your voice. Mobility Suite currently runs on PocketPC and Embedded Linux operating system (OS) but can be ported to virtually any device or OS.

As those billion mobile connections continue their growth, and more people use more devices, the need also grows for a user interface that frees them from distractions. WebSphere Everyplace Multimodal software is a multimodal browser that is enabled for concurrent voice and data navigation. It gives employees access to data over virtually any currently available device on any network. This has become increasingly important as the industry moves

toward multimodal interaction, using several forms of input and output, such as voice and text simultaneously in the same application.

Connection Services

WebSphere Everyplace Access software is easily installable and downloadable and provides support for a broad set of existing device platforms including PocketPC, Symbian, PalmOS and Linux—transforming these consumer products into mobile enterprise terminals. Everyplace Access allows companies to manage a multitude of devices over variable connectivity modes and extend existing investments in applications, portals and skill sets. Specifically designed to help simplify wireless connectivity for the enterprise, WebSphere Everyplace Access delivers the technology needed to give mobile employees access to productivity data and enterprise applications from virtually anywhere, at anytime.

WebSphere Everyplace Connection Manager software can help boost the productivity of mobile workers by giving them highly secure, uninterrupted access to the data they need. WebSphere Everyplace Connection Manager enables enterprises to efficiently extend their existing applications to workers in the field over many different wireless and wireline networks. It provides compression and other network optimizations that increase user response time and lower networks costs. It features seamless cross-network roaming, which makes it possible to dynamically switch network connections without interrupting applications.

Automotive Services

Workplace Client Technology, Micro Edition supports the entire automotive product life cycle from initial concept to end of life. WebSphere Everyplace Telematics Device Frameworks and Services enables developers to quickly build telematics devices. The Frameworks and Services offering encompasses a range of services including general telematics consulting, prototype development, full-scale production and long-term maintenance. It brings open, standards-based technologies to automotive telematics applications, provides access to Internet-based e-business information and services, promotes faster time-to-market, and includes voice-enabling software. Additionally, Frameworks enables application development for telematics reference designs based on the Motorola PowerPC® architecture, Intel® XScale™ architecture and Hitachi SH4 architecture.

Industrial and Home Services

WebSphere Everyplace Device Framework for Gateways and Set-Top Boxes provides the software capabilities to enable commercial and integrated home management and services, such as security monitoring, commercial and home control, broadband access to the Internet and communications service.

As a gateway, it acts between the Internet and the wireless or wireline devices within the enterprise, commercial industry and/or home environment.

In addition, the gateway framework provides basic network services such as firewall, Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP) and Secure Sockets Layer (SSL). These services enable managed embedded controllers, industrial gateways, appliance controls and energy management, monitoring and security, plus OSGi-based services for deployment of software features and updates.

For set-top boxes, it extends the gateway framework by providing additional services such as Voice-over Internet Protocol (VoIP), video on demand delivery, media players for DVD, MPEG and MP3, and both digital and analog television receivers.

Smartcard Services

IBM offers the WebSphere Everyplace Chip Operating System, JavaCard/Open Platform Edition (JCOP) smartcard solution that enables card issuers to build, deploy and maintain new and innovative card services. IBM partners with silicon providers and smartcard manufacturers who deliver a comprehensive platform for smartcard services on over 37 million cards. IBM pioneered smartcard solutions for financial credit systems by announcing, with Visa International, the Smart Breakthrough program. IBM smartcard solutions are certified and adhere to strict industry standards for:

- Government and corporate solutions that encompass identification cards for voter registration, passports, visas, employee identification and biometrics
- Access solutions for both physical access to facilities as well as logical access to corporate and wireless networks
- Financial solutions for credit, stored value, Europay MasterCard Visa (EMV) migrations, PayPass, vending machines and spatial information management (SIM) cards
- Secure data solutions for healthcare and loyalty cards.

Tools

IBM has a wide range of tools that can assist the development community in the creation and testing of higher-value data services.

WebSphere Studio Device Developer

WebSphere Studio Device Developer software is an integrated development environment (IDE) that allows teams of developers to build, test and deploy J2ME applications to pervasive devices. A member of the WebSphere Studio family of application development products, and powered by Eclipse technology, WebSphere Studio Device Developer delivers productivity through integration by enabling device applications to be integrated, using industry standards and middleware with existing enterprise business processes running in production today.

IBM toolkits provide tools and run times that support the rapid development of modular, portable and hardware-independent software. IBM uses the Eclipse.org extensible architecture to create domain specific toolkits that speed development of new and innovative services.

- Micro Edition Toolkit for WebSphere Studio software enables developers to extend enterprise applications to mobile devices.
- Everyplace Toolkit for WebSphere Studio software builds upon the support for open Web standards, including Java, JavaServer Pages (JSP), XML, database wizards, Web services and rich media. It also contains the tools needed for the creation and testing of Extension Services for WebSphere Everyplace.
- Voice Toolkit for WebSphere Studio software can help developers to create voice applications in less time, using a VoiceXML application development environment. Voice Toolkit features grammar and VoiceXML editors as well as a pronunciation builder so that application developers do not need to know the internals of voice technology.
- WebSphere Voice Application Access Toolkit for WebSphere Studio software enables the development team to create, test and debug custom voice portlets. The toolkit provides the capability to customize speech technology resources and extends WebSphere Studio for voice portlet application development.

OSGi

The future growth of the e-business marketplace depends on open standards. In effect, standards create common languages, and open source software confers to all players in the marketplace – application developers, device developers, service providers and enterprise customers – a level playing field. OSGi is an industry plan for a standard way to connect devices to the Internet using open standards. Benefits of the OSGi framework include:

- Maintains and upgrades services without customer intervention
- Enables the addition of new devices and services provided by others
- Extends the life of an application – for example, by adding new features from a manufacturer or third-party supplier or service provider
- Extends the life cycle without a retrofit, thereby delaying the onset of product obsolescence
- Provides service provisioning and aggregation and seamless services over different venues (home, car, mobile, etc.)
- Decreases the time-to-market and development costs for new applications and services by increasing software reuse
- Enables new service procurement and deployment post-sale of the device
- Reduces software maintenance costs in both manufacturer and dealer distribution channels
- Supports multiple service providers on a common open platform.

IBM opens new opportunities for pervasive e-business

IBM is helping to create the new on demand environment by extending e-business applications to the new class of connected embedded devices that are becoming so ubiquitous in our world today. With the infrastructure-optimized offerings of the WebSphere Client Technology, Micro Edition, IBM extends its platform for e-business to pervasive devices and can help you develop, deploy, maintain and manage applications and services in smart devices now, and in the future.

For more information

To learn how your company can benefit from the WebSphere Client Technology, Micro Edition products, contact your local IBM sales representative or visit our Web site at:

ibm.com/pervasive



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05-04
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Printed in the United States on recycled paper containing 10% recovered post-consumer fiber.

¹ 'The Mobile Opportunity is Still Alive.' Gartner, Inc. November 2001.

² 'Global handset sales up,' Herald Sun, August 6, 2003, and 'PC Sales Stall,' PCWorld, June 10, 2003.

