



Wireless Enterprise Applications for Mobile Information Management

Development Options and Business Decisions

| | |
|--|----|
| Introduction | 1 |
| E-Business Goes Wireless | 2 |
| Mobile Information Management—What's Right for Your Organization? | 3 |
| Wireless Deployment Objectives | 4 |
| Wireless Development Options | 11 |
| Palm's Commitment to Mobile Internet Solutions | 23 |
| Conclusion | 24 |
| Resources for Mobile Information Management | 25 |
| Glossary | 26 |

Wireless Enterprise Applications for Mobile Information Management

Development Options and Business Decisions

Introduction

Mobile information management bring together two major trends affecting today's workforce: increasing mobility and increasing dependence on the Internet. In fact, industry analyst Meta Group predicts that within a couple of years, mobile workers will be in the majority (Meta Group, 2/14/00). Forrester Research predicts that within two years, 57 percent of Web users will be accessing it by wireless connection (*eWeek*, 7/3/00). As wireless connections emerge as the dominant mode of accessing the Internet—which is becoming a fundamental business platform providing access to the full range of enterprise applications—developers must begin today building mobile information management solutions for the enterprise.

Mobile wireless computing offers many benefits. Corporations can provide workers with nonstop access to e-mail and enterprise applications, allowing them to work productively no matter where they are. Field data can be captured in real time and made available without delay to the rest of the organization, improving coordination and responsiveness.

Yet mobile computing also poses significant challenges. It's a new type of computing, with unique user behaviors and expectations. And the wireless world is still young and characterized by emerging protocols and competing technologies.

This paper aims to help IT project managers understand wireless development and make strategic decisions that will encourage development teams to build highly effective mobile Internet solutions. The paper provides information you can use to minimize total cost of ownership and maximize return on investment. It explores

various approaches to wireless development—Wireless Application Protocol (WAP), Web clipping and native Palm OS® applications, describing the possibilities and advantages of each. The paper also offers guidelines on which approach may be best suited for certain types of applications.

E-Business Goes Wireless

Today, enterprises must be prepared to develop applications for an e-business world in which more than half the workforce will be mobile and most people will access the Internet via wireless connections.

Leading corporations all over the world are using intranets and the Internet to provide their workforces and business partners with mission-critical computing resources. Internet technologies are becoming the primary means of deploying new frontline e-business applications in such areas as customer relationship management, sales force automation and supply chain management. They're also being used to link e-business applications with backbone enterprise resource planning (ERP) systems and databases, increasing the return from the major investments made in these resources during the '90s.

But corporations need to be thinking about how to turn these powerful new applications into mobile information management solutions. It won't do to provide only deskbound, browser-based access when 75 percent of the workforce will be mobile at least 25 percent of the time by 2003–4 (Meta Group, 2/14/00). In fact, International Data Corporation (IDC) is predicting that by 2002 the majority of Internet access will be through wireless connections. Gartner Group's Dataquest division says that by 2003 there will be more than a billion users of wireless handsets.

The move toward mobile information management solutions is being driven by more than numbers. The benefits of using wireless handhelds to mobilize e-business have become very clear in recent months as companies in every industry have now deployed applications and achieved results:

- A sales force that receives fresh leads and customer information all day is fiercely competitive and more productive than its rivals.

- A technical service team linked into a global problem resolution database closes trouble tickets faster and leaves happier customers in its wake.
- Managers with uninterrupted access to e-mail and flash reports on critical projects make smarter decisions and can handle a larger scope of control.

That's just the start. As IT managers get their hands on wireless handhelds, they're inventing surprising ways to move their companies to the forefront of e-business. The "new Internet"—the mobile Internet—is emerging as a fundamental enterprise computing platform in the second decade of the Internet. Which is why every company needs to have a mobile wireless Internet strategy.

Mobile Information Management—What's Right for Your Organization?

Making the right decisions at the outset can simplify wireless development.

While the need to mobilize is clear, questions and concerns remain. Various wireless technologies may be competitive or complementary. "Standard" products don't always work together. And there's a growing user backlash against the over-hype and under-performance of some wireless solutions. Which approaches will deliver highest user acceptance and productivity with lowest cost and complexity? Be most manageable and secure? Give you flexibility for the future?

Palm, Inc. has produced this paper to help you sort out your technology options and make informed business decisions about mobile Internet solutions. We're the market leader: over 75 percent of personal companions sold worldwide are based on the Palm OS® platform (IDC, 6/00). We're the inventor of the Palm™ VII handheld, which offers integrated wireless Internet access. The Palm OS platform, which runs on all our handhelds as well as products from licensee partners such as Sony, Kyocera, Handspring, IBM and Symbol, has over 7,000 applications and over 120,000 registered developers. Palm mobile Internet solutions are being used today for mission-critical enterprise applications by hundreds of innovative organizations around the world (see www.palm.com/enterprise for customer success stories).

We also hope to give you some insights into mobile information management, which are the next logical extension of enterprise computing with unique user behaviors and expectations. In this paper we share what we have learned about mobile users and applications so that you can make the best possible decisions for your enterprise.

Wireless Deployment Objectives

"Once your mobile workers can read and answer e-mail from anywhere, once access to your corporate data is available continuously and once schedules can be coordinated instantly, it's hard to consider going back."

Network Computing, 7/10/00

The overall objective of mobile e-business solutions is to make mission-critical information available from any location.

Until now, users had to be at their desks to access enterprise e-business applications and resources. As a result, those closest to customers and business partners—sales and service reps, marketing managers and executives traveling to meetings—could be out of touch for hours, days or even weeks. As shown in Figure 1, building wireless into e-business solutions enables all workers to have uninterrupted access to mission-critical information—wherever they go.

Case Study: Wireless Intranet Access to Medical Information— Virtually Anytime, Anywhere

Physicians at Cedars-Sinai Medical Center used to have to go to their offices or specific hospital locations to access patient records and other medical information. Today more than 300 physicians can access this information using Palm™ VII handhelds as they go about their rounds and responsibilities. The result is higher quality healthcare for patients, since physicians can be wherever they're needed while staying fully informed.

The native Palm OS® applications include a physician lookup directory, paging and wireless access to e-mail, secure access to confidential patient information and wireless order processing

for books and articles from the medical library. Lab test results, physical evaluations, consultations, surgical reports and admitting histories can all be accessed via simple pull-down menus and pick-lists. Physicians can send e-mail to colleagues by simply tapping on the displayed e-mail address. The solution also incorporates alphanumeric paging, letting physicians send messages to other clinicians' pagers and preloaded third-party wireless applications useful in healthcare, such as HealthNet's MedLine medical database and Go's Translator language translator.

There are also specific considerations, from the point of view of users and IT, that you should keep in mind when making wireless enterprise application deployment decisions.

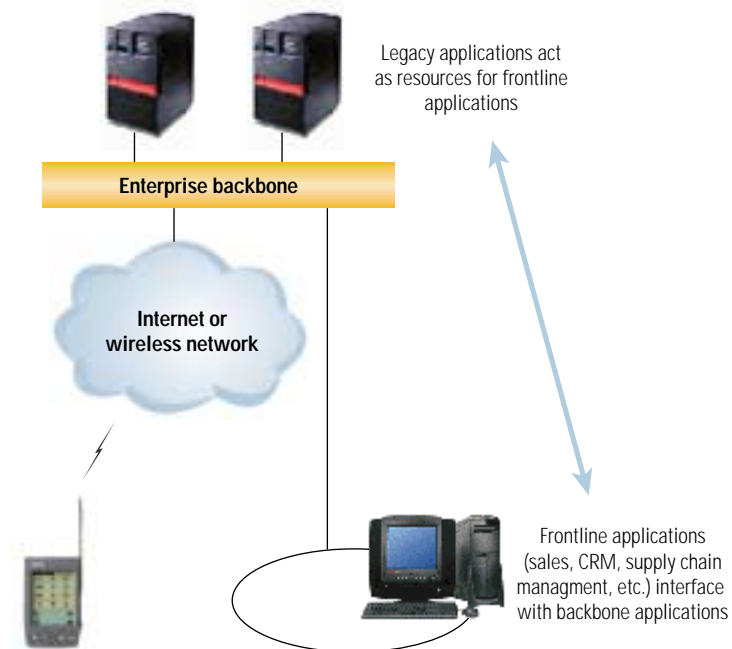


Figure 1. The New E-Business Infrastructure

Users—Give them more access but keep the solution simple

As handhelds evolve from their origins as personal information managers into their new role in mobile Internet solutions, they should remain as easy to use and as congenial as ever.

Enterprise developers can now provide handheld users with tremendously expanded access, including links to backbone ERP applications and databases. The challenge is to deliver all these elements while maintaining the speed and simplicity that made Palm Powered™ handhelds a success in the first place.

The market has made it clear again and again that these characteristics are essential. This was shown when a number of companies tried to sell handhelds into the U.S. market and failed. It was only with the arrival of a handheld that was decidedly more simple and easy to use that the market took off. The same sort of phenomenon has occurred in handheld markets in Europe and Asia. The resounding message from users is “keep it simple.” Developers should avoid trying to squeeze desktop enterprise applications onto handhelds. Projects are more likely to succeed if built specifically for mobile users, who have their own method of computing.

Data transfer—Mobile workers are in a hurry, don't make them wait. Mobile users work differently than deskbound users do. Instead of spending two to three hours at their computers a couple of times a day, mobile users are more likely to engage in short sessions with their handhelds many times a day. Each time, they're in a hurry.

In the consumer market, sluggish applications have caused a flood of complaints, and some users are even disabling Web access features on their cell phones. To ensure user acceptance and productivity, you'll want to choose efficient ways of moving information from the enterprise backbone to the handheld. Here are some methods:

- Infrared (IR) or cable connection between handhelds or between a handheld and a cell phone
- Synchronization cradle connected to a desktop machine or directly to an enterprise network
- Dial-up wireline connection to a network server
- Wireless connection to a network server
- Wireless network connection through a cell phone or other device with wireless capabilities
- Fixed wireless LAN (IEEE 802.11b standard) within office buildings, airports, hotels, convention centers, etc.
- And soon, wireless personal area networks (PANs) based on the emerging Bluetooth standard, which will be designed to enable handhelds to exchange information with cell phones, desktop computers and other devices

Some methods are more appropriate than others for certain applications. As shown in Figure 2, the most effective means of data transfer will depend on the size of the data to be transferred, its volatility and the value of those changes to the user.

For example, a stock quote is a small piece of data that changes frequently and can be transmitted instantly. It has value to the user only if received in a timely way. All of which makes a stock quote ideal for transmission across wireless networks. Another example of an application that's well-suited to wireless data transfer is online directions to a restaurant. While this information might not be volatile, it certainly is timely to a user circling the block searching for an address, and it's only valuable if received right now.

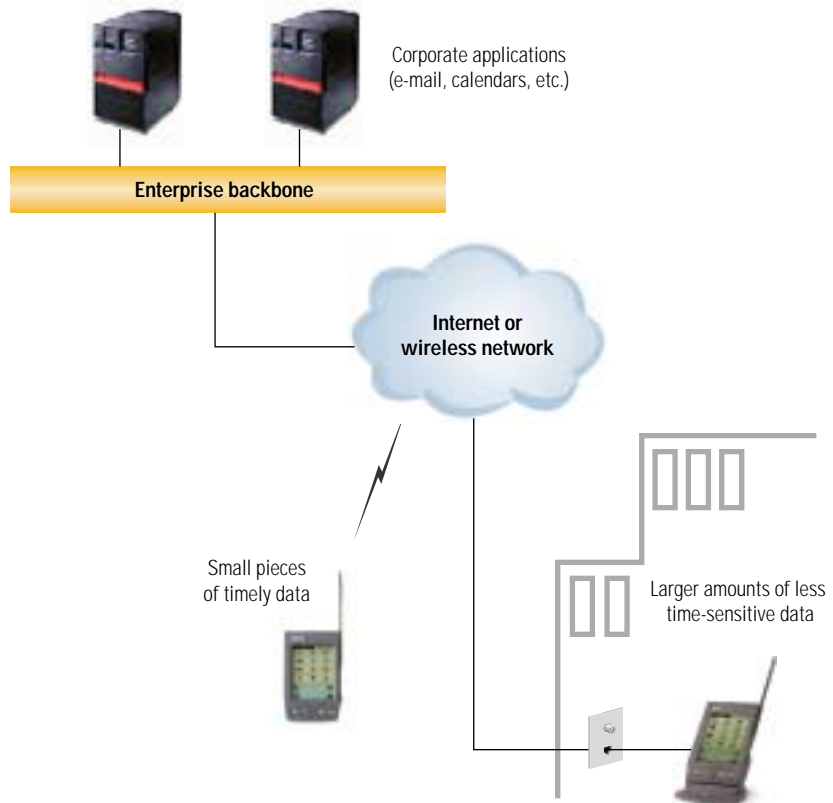


Figure 2. Appropriate Means of Data Transfer

On the other hand, larger amounts of data that change infrequently and have longer lifespans may be better suited to transfer over other types of links. Updates to contact managers or online manuals and catalogs, for example, can probably wait until users are in a hotel, airport or office building where they can take advantage of a synchronization cradle, a fixed wireless or wireline LAN with a high-speed interface to the Internet, or a dial-up connection over the public telephone network.

Because handheld users will increasingly want access to a wide variety of applications, it's important for developers to choose a platform that encompasses the full range of data transfer methods. In addition, some platforms allow intelligence to be built into the client, so that applications can select the most appropriate available method on the fly.

Data access—For truly critical information, handhelds should provide stand-alone access. No matter how many data access

methods applications employ, there will be times when none is available. Users will be out of the range of wireless or cellular networks and away from synchronization cradles and modems.

A good rule, therefore, as shown in Figure 3, is to make sure all truly mission-critical data can be stored on the handheld and travel with the user. “Mission-critical” includes information and tools users can’t be without because lack of access would cause work to halt. Generally, it’s more important for this type of information to be portable than it is to be accessible in real time.

Imagine, for example, a field technician repairing a piece of equipment on the basement floor of an office building, trying to access an online repair manual that resides on a Web server. His handheld’s

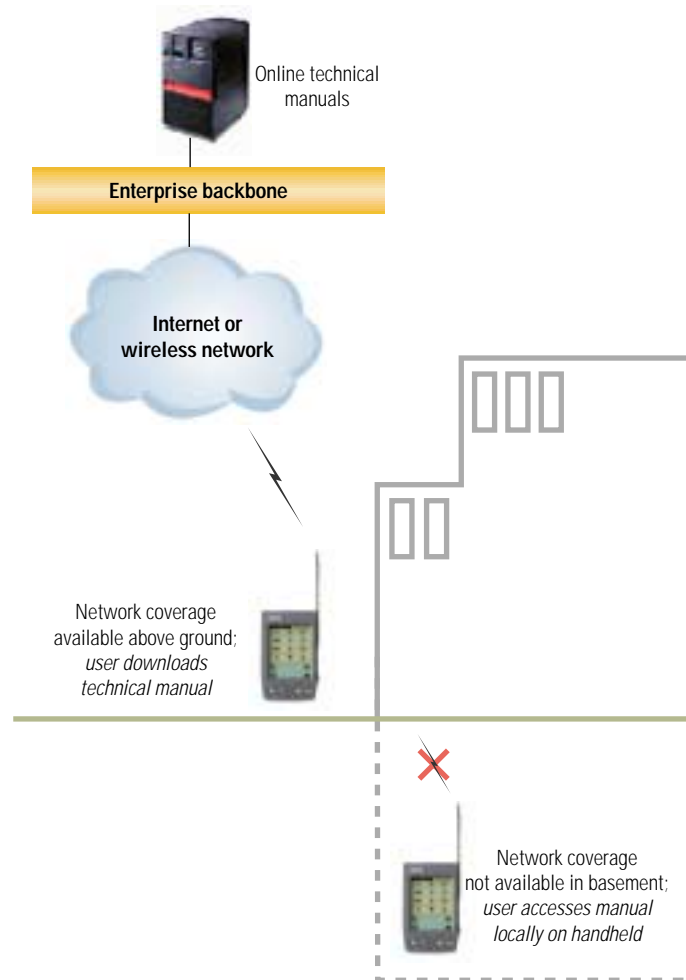


Figure 3. Data Accessibility, Virtually Anytime, Anywhere

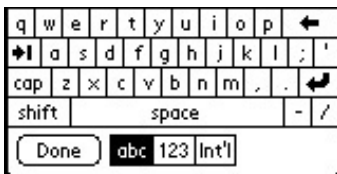
Data input modes



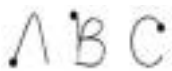
Note Pad



Infrared Transfer



Onscreen keyboard



Graffiti® software writing



Palm™ Portable Keyboard

wireless modem is out of range, so each time he needs to consult the manual he has to walk upstairs, access the information and return to where he's working. But what if, before going down into the basement, he could have downloaded the pertinent portion of the technical manual onto his handheld and run the application from the basement?

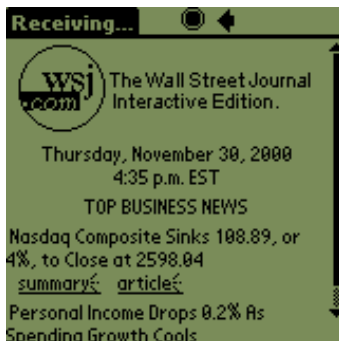
Handheld platforms that incorporate client-side data storage and processing power enable users to access information wherever they are—in the basement, inside a ventilation duct—without interrupting their work. When a network connection again becomes available, local resources can then access server-side applications and databases as needed to update information or perform transactions.

Data interaction—Users want to look and act. There has been a significant change in the way people use handhelds. Developers can no longer assume that users will do all of their input on desktop machines when at the office and be satisfied to simply view the information when on the road. Today, mobile users expect handhelds to help them manage information by being able to select data, drill down for more detail, analyze it, input new data and perform transactions.

There are three aspects to successful handheld user interaction: display characteristics, available user input modes and appropriate application design for mobile computing.

First, the handheld should have a display that presents information in an instantly legible format. This is partly a function of the size of the display—it should be large enough to allow use of menus, check boxes, buttons, graphics and other presentation techniques that convey information quickly. It's also partly a function of how efficiently the available “real estate” on the display is used. Only menus and navigation aids related to the immediate task should be visible; everything else should be hidden until needed.

To work efficiently and comfortably with the information they see displayed, users need to have a variety of input modes. Developers today can choose platforms that support input by infrared, note pad, touch screen, onscreen keyboard, Graffiti® software and fold-out or clip-on full-size keyboards.



Headlines and drill down

The application itself needs to be designed for rapid work on small screens. Here, the world of business-to-consumer (B2C) e-commerce offers some good models. For example, when accessed by desktop browsers, news sites like *The Wall Street Journal Online* and *USA Today Online* offer a plentiful array of features, images and streaming media. When access is from a handheld, however, what works best is just short headlines. This type of information can be transmitted quickly and understood at a glance—perfect for the instant work mode of mobile users. If the headlines include something of interest, users simply tap the screen to drill down to a summary. If the item is still intriguing, they can download the full text of the story.

As an enterprise developer, you can take a similar approach. If you're building an at-a-glance sales management reporting application, for example, initially present only top-line revenue results for each region, giving users the option of drilling down to look at details such as territories, discounts and gross margins.

IT—Extend enterprise systems, manage wireless users and provide security

For IT project managers, key objectives include seamlessly integrating this new paradigm of computing with existing systems and supporting and protecting corporate networks, which now extend to the increasing numbers of mobile computing users.

Many IT organizations today are overwhelmed by the prospect of trying to tackle wireless development with already strained resources. In addition, the demand for mobile applications is often urgent, as companies come to view wireless technologies as a strategic means of seizing competitive advantage. There are measures IT project managers can take, however, to bring wireless into enterprise computing infrastructures quickly and painlessly.

Simplified development—Building wireless applications doesn't have to be complex. Although wireless mobile Internet applications are a new way of computing, companies can build them with the people, skills and development tools already available in the IT organization. Leading platforms, for example, allow developers to work in C++ or Hypertext Markup Language (HTML) as well as to take advantage of Extensible Markup Language (XML) middleware for providing access to legacy data.

More information about Palm wireless products and services is available at:

<http://www.palm.com/resources/shareware.html>

<http://www.palm.net/apps/>

Probably the most important thing IT project managers can do to simplify development efforts and stretch resources is to choose a platform that allows applications to be built once and run on multiple networks and handhelds. The wireless marketplace is still young, and there are many different kinds of networks and competing standards jostling for place as the technology evolves from 2G to 3G with stopovers at 2.5G. But IT managers can choose handheld platforms that make most of these differences transparent, allowing development teams to focus less time on compatibility issues and more time on designing great applications that fully meet mobile user needs and corporate objectives.

Another way to speed development is to fully leverage products and services from the wide variety of vendors participating in the wireless market. There are a wealth of wireless handhelds, add-on products, and software and services on the market, with more available practically every day. Companies increase their choices by going with leading platforms that are open, licensed by other leading vendors and attracting large numbers of third-party adherents.

Security for the entire network—Leading wireless platforms incorporate industrial strength measures. Handheld security is indivisible from the overall security of corporate networks. By choosing platforms that incorporate strong security methods, such as Secure Sockets Layer (SSL) and digital certificates, you can safely allow wireless handhelds to connect with backbone enterprise applications and databases.

Future-proofing wireless applications. The wireless world is changing quickly. Not only are new technologies and standards emerging, but the market now has such momentum that it's attracting a constant influx of new ideas, vendors and product entries. Make sure you have a high level of confidence that the wireless platform you choose is open to broad vendor participation and able to incorporate advances from all directions.

Wireless Development Options

There are several ways to develop wireless mobile e-business applications. The best option depends on what you're trying to accomplish and what type of experience you want to create for your users.

Here are your choices:

- Create regular Web pages that users can try to view from the small displays on their handhelds and Web-enabled phones.
- Build applications optimized for handhelds using the Wireless Application Protocol (WAP). WAP applications reside on Web servers. Displays, geared toward cell phones, usually allow minimal text and interaction.
- Build applications optimized for handhelds using Web clipping, an HTML-based technology that also runs on Web servers but allows for rich graphical displays and interactions.
- Build native Palm OS® applications, with logic and data distributed as makes sense across the handheld and Web server. Native applications can incorporate on-line and off-line components and are available when network connections are not.

With the exception of creating regular Web pages, each of these approaches is appropriate for certain types of projects. Table 1 summarizes their capabilities. It's followed by a discussion of why you'll want to avoid the first method and when you'll want to use the others.

Regular Web pages

While this method is simplest for IT, it's frustrating and inefficient for users and may have a strongly negative impact on mobile productivity.

Table 1. Wireless Development Option Comparison

| <u>Capabilities</u> | <u>Regular Web pages</u> | <u>WAP application</u> | <u>Web clipping application</u> | <u>Native Palm OS® application</u> |
|--|--------------------------|------------------------|---------------------------------|------------------------------------|
| <i>Data transfer</i> | | | | |
| Multiple modes | No | No | Limited | Yes |
| Intelligent selection | No | No | No | Yes |
| <i>Data access</i> | | | | |
| Local databases | No | No | No | Yes |
| Local processing | No | No | No | Yes |
| <i>Data interactivity</i> | | | | |
| Rich display | No | No | Yes | Yes |
| Flexible input | No | No | Yes | Yes |
| Mobile computing design | No | Yes | Yes | Yes |
| <i>International geographic coverage</i> | Yes | Yes | Yes | Yes |

Regular Web pages are developed in the usual way and HTML forms, CGI scripts and databases are stored on the Web server.

Most wireless networks today top out at speeds of under 20 Kbps (a few reach 28.8 Kbps), resulting in slow transfer times for Web pages with the usual mastheads and graphical elements.

Faster networks will make the wait shorter. So-called 2.5G networks will increase current top speeds by up to 10 times; 3G networks, while they won't arrive in the U.S. for several years, will deliver speeds in the megabits per second (Sources: *Network Computing*, 7/10/2000; *Data Communications*, 3/7/99).

Still, high-speed networks won't improve the experience all that much. When users are wasting time scrolling through Web pages laid out for desktop viewing and trying to locate the "needle" of information they're seeking in an enormous "haystack" of content, they're not working productively. The whole point of providing wireless mobile access to mission-critical applications is lost in the execution.

Wireless Application Protocol (WAP)

WAP works well for building applications that deliver small chunks of timely data with limited lifespans, such as stock quotes, weather forecasts and discount offers. It's also ideal for situations where there's a large database of content, such as an online encyclopedia, from which the user requires only a small piece at a time.

"WAP works best when only small amounts of data, preferably a few words, are transmitted as a result of a proscribed query that requires nothing more than the push of a button on a mobile phone to activate."

TechWeb News, 7/6/00

WAP is an emerging protocol promoted by the WAP Forum (headed by primary WAP developer Phone.com along with Ericsson, Motorola and Nokia). It was designed to serve up information to cell phones, which generally have small screens that display only a couple of lines of text. The WAP architecture puts query software on the handheld and application logic and data on a Web server. A WAP gateway is required to translate Internet protocols and formats to and from WAP. Gateway implementations by some vendors are incompatible. To use certain phones, for example, you must have a gateway supplied by Phone.com.

Data transfer—WAP devices can receive data only over compatible WAP networks. Data must be transmitted to handhelds over a wireless wide area network that incorporates a compatible WAP gateway (different WAP vendors have different implementations).

A few enterprises also have their own WAP gateways, enabling them to provide connectivity over wireless LANs.

Data access—WAP applications are available only when network coverage is available. To access data, users must have wireless network coverage or some other type of connection to the Web server where the application logic and database reside. As a result, WAP is inappropriate for mission-critical applications (customer relationship management, inventory management, etc.) and personal productivity applications (schedules, contact management, etc.) that must be constantly accessible.

In addition, because all the processing takes place on the Web, WAP applications can be tedious for processes that involve multiple decisions or transactions. Imagine a sales rep using a fast quote application, which allows her to try various product configurations and apply various discounts. Each time a calculation has to be done, the application sends a query across the wireless network back through the gateway to the server, which does the calculation, builds a new WAP page and then transmits it back over the network through the gateway to the handheld. Going back and forth wastes bandwidth, and if the network connection is lost midway through the process, the task can't be completed and the work may be lost.

Data interaction—WAP applications are designed for tiny displays and limited user input. User interaction with WAP applications tends to be limited, since most WAP applications are built for wireless phones with small screens that allow a couple of lines of display, enough for 50 characters or less.

WAP phones also have tiny keypads that make inputting difficult. Mobile e-mail—a potential “killer application” for wireless networks—has been severely constrained by the tedium of answering e-mails using these tiny keypads.

As a result of the limitations of target devices, WAP developers generally take a minimalist approach, presenting users with only a single piece of data or decision at a time. In most cases, they avoid graphics (except for maps in geographical applications) as well as user interface elements that could create a richer experience and improve legibility and ease of use.

"One of the main challenges is the continuing proliferation of handhelds with different features, standards and types of usages that support WAP."

*Developer's Notebook
AnywhereYouGo.com, 7/18/00*

Simplified development—Development is generally targeted at a specific WAP phone and service. Developers may need to restrict their application to a specific WAP phone and service or build more than one version. A number of vendors have not adhered fully to the WAP standard and have added proprietary enhancement and extensions. To be safe, start by identifying the particular set of WAP tags supported by your target phone/gateway.

Wireless security—WAP incorporates industrial-strength security. WAP incorporates Wireless Transport Layer Security (WTLS), a digital certificate based system that provides industrial-strength security but is still an emerging protocol.

Future proofing wireless applications—WAP's future is being debated. It's hard to tell about WAP's future. There are people in the industry who believe it will become an ubiquitous standard, others who see it as a valid stepping stone to XML- and IP-based wireless networks, and still others who see it being displaced before it ever takes hold. Although Europe seems committed, users there have been underwhelmed with slow response times and the paucity of useful services—in sharp contrast with the booming success of competing technologies such as the DoCoMo i-Mode service in Japan.

Web clipping

Web clipping is the best choice for network-resident applications that require a richer display and more user interaction than typical WAP applications. It's well suited to presenting multiple pieces of information simultaneously, as in online catalogs, travel guides, real estate home finders or online trading applications.

Developed by Palm, Inc. and included in the Palm OS® platform, Web clipping is supported through either built-in or add-on features by every Palm Powered™ handheld. Currently there are over 400 Web clipping applications available, many of which are available free for downloading from the Palm.Net™ repository.

Web clipping optimizes HTML, a universal presentation language, for display on small handheld screens. It also optimizes data transfer for wireless networks by storing static HTML content on the handheld and thus minimizing the amount of data that travels over the wireless link.

The architecture includes a client-side Web clipping application running on a Palm Powered™ handheld, a proxy server and a content server. The client-side application is constructed in HTML and translated into the Web clipping application format, which is a subset of the HTML 3.2 standard. The proxy server handles translation between the HTML on the content server and the Web clipping HTML subset that the handheld understands. XML middleware can be used to store content from ERP applications and other corporate backbone resources in an application-neutral form. An Exstensible Style Language (XSL) style sheet can then be used to transform legacy content from XML into the Web clipping application format.

Data transfer—Web clipping applications can send and receive data over a variety of wireless and wireline connections. Web clipping applications can send and receive data over most leading wireless networks in the U.S. and Europe. In addition, with the use of the Palm™ Mobile Internet Kit, data can be transferred to Web clipping applications by connecting a Palm Powered handheld via IR beam or cable to a wireless cell phone. And, when wireless network coverage is unavailable, Web clipping applications can even get data via wireline modem.

Data access—Some kind of network connection must be available. As with WAP, data access can occur only when the user has a network connection, since the data and most of the processing reside on a Web server.



Palm™ Web clipping application

Data interaction—Users can see more and do more. Web clipping applications usually offer more generous information displays and easier user interaction than is typical of WAP applications. Screen sizes are large enough to allow multiple pieces of data to be presented at once and accommodate the use of check boxes, buttons, menus and graphics that quickly and efficiently communicate input choices and results. (Palm™ provides extensive guidelines and models, along with complete Web clipping libraries, to help you build applications that deliver information succinctly and clearly to mobile users.) Users can simply tap or touch the screen to drill down from summary information to more detail. Input modes include infrared transfer, note pad, touch screens, Graffiti® software and fold-out or attachable keyboards.

Simplified development—Web clipping applications are built in HTML and run on all Palm Powered™ handhelds. Web developers with HTML experience can begin building Web clipping applications with minimal preparation. In some cases, no changes to the HTML content of existing sites is necessary, only the creation of query applications. Hundreds of Palm™ Web clipping applications are already available for a wide range of purposes. Palm also provides several HTML extensions that enable Web servers to send content to both standard browsers and Web clipping-enabled handhelds.

To find out more about Web clipping, take a look at these presentations from the 1999 Palm Source™ Conference:

- “Building Web clipping applications with HTML”:
<http://www.palmos.com/dev/news/events/palmsource/1999/data/track4/446.pdf>
- “Augmenting Web clipping applications with C/C++”:
<http://www.palmos.com/dev/news/events/palmsource/1999/data/track4/448.pdf>

You can also download a copy of the Web clipping Developer's Guide and find out about joining the Web clipping Forum at:
<http://www.palmos.com/dev/tech/Webclipping>

Developers build applications once for all Palm Powered handhelds. The Palm™ VII handheld has built-in support for Web clipping; the wireless Kyocera pdQ cell phone needs only the addition of Palm Mobile Internet Kit software. In addition, you can use the Mobile Internet Kit to add wireless communications and Web clipping to any other Palm Powered handheld, including the Palm™ III and Palm™ V series handhelds. You can also use this software to provide wireline-connected handhelds with the ability to support Web clipping.

Web clipping, like the Palm OS® platform, is network neutral. Currently, Web clipping services are available on leading U.S. networks, including the BellSouth Wireless Data Network (for the Palm VII handheld), AT&T Wireless (using the Ominsky modem), and Sprint PCS and Verizon networks (using the Palm Mobile Internet Kit).

Wireless security—Web clipping incorporates industrial strength security designed specifically for mobile computing. In Web clipping, encryption and authentication between the handheld and the Web clipping proxy server is performed by Elliptic Curve Cryptography from Certicom Corporation, which offers extremely high levels of security at small key sizes. On the server side, the high-strength, North American non-exportable version of SSL is used for encryption and authentication between the Web clipping proxy server and corporate Web servers providing HTML content. This is the leading security protocol on the Internet, used by all major e-commerce sites. For added security, when providing wireless access to enterprise applications and databases, the Web clipping proxy server can be directed to another proxy server on the enterprise firewall, which then communicates through a “pinhole” to backbone content servers.

Future proofing wireless applications—Palm has a strong track record for forward compatibility. Looking to the future and based on the past, you can have confidence that your Web clipping applications will run across all future Palm Powered™ handhelds and all leading wireless networks.

Native Palm OS® applications

The Palm OS platform is the best choice for mission-critical wireless applications that must be constantly available to mobile workers. It supports rich, complex, robust functionality. You can distribute application logic and databases across the client side and server side as you see fit and make use of both on-line and off-line modes.

The Palm OS platform is a full-featured operating system that is most widely used for handheld computing. Rather than trying to fit all the features of a desktop computer into a tiny package, the Palm OS platform was designed specifically for mobile information management. This approach has been embraced by leading corporate software firms including Computer Associates, IBM, Lotus, Remedy, SAP, Sun, Sybase and Vantive.

The Palm OS platform consists of five primary components:

- Palm OS software
- Reference hardware design
- HotSync® conduit data synchronization technology for one-button synchronization
- Platform component tools including an API that enables developers to write applications
- Software interface capabilities to support hardware add-ons

The Palm OS architecture is flexible and open, giving developers, licensees and OEM partners the means to rapidly deliver innovative, competitive computing solutions. In addition, Palm provides the tools and support infrastructure corporations need to deploy the Palm OS platform to thousands of employees. For example, our suite of handheld management products, include a Palm HotSync Server, which can be accessed by handheld users through both wireless and wireline connections. IT managers can utilize this server to monitor and drive the software configuration on a large installed base of handhelds.

Data transfer—Native Palm OS® applications receive data fast, in lots of different ways. Moving data between enterprise backbone systems and handhelds is efficient, since generally only limited amounts of data are being sent over the network and the client side application handles presentation.

Take, for example, a sales force automation application. Field sales agents use handhelds to view product listings, prices, applicable discounts and inventory availability. The application also lets them generate quotes, reserve items in inventory, confirm shipping dates, close deals on the spot by capturing client signatures on purchase orders, and move products from inventory to shipping.

Response times are fast because the client side application calculates discount pricing, quotes and purchase order amounts locally, accessing network servers only when new information is needed. If just four inventory stock levels in a list of 20 have changed, the application retrieves only those four pieces of data, plugging them into an existing form on the handheld rather than resending the entire page as is necessary with WAP or Web clipping. Similarly, as sales agents input purchase data, the application sends the server only new information. If product numbers and quantities are the same as on the last order but the delivery date is different, only that piece of data travels across the network.

In addition, unlike WAP and Web clipping applications, which are written in the presentation languages Wireless Markup Language (WML) and HTML respectively, native Palm OS applications send only data. When prices change, just the new prices are transmitted over the network, without the overhead of instructions on how to build the pricing sheet on the handheld.

There are a number of ways Palm Powered™ handheld applications can send and receive data. Data can travel over a wireless network or a fixed wireless LAN. Handhelds can exchange data with other handhelds or wireless devices via IR beam or, in the future, over a Bluetooth personal area network. Synchronization cradles can link handhelds with desktop PCs or network servers. Wireless handhelds can also use wireline modems as a backup, dialing up connections to the Internet or to corporate network servers.

Client-side intelligence enables applications to choose an appropriate data transfer channel or wait until one is available. For example,

the local sales force automation database on the handheld could be updated sporadically with individual price and discount changes over a wireless link throughout the day. The major weekly across-the-board update of new products and configurations, however, could wait until sales agents are at a hotel or airport lounge with access to a faster Internet connection.

Data access—Mission-critical information is always available, even when network coverage is not. Native Palm OS® wireless applications are completely portable—they travel with users and can be run whether or not network coverage is available. You can put databases, processing power and intelligence on the handheld, making certain applications and data accessible at all times.

Imagine a field sales agent calling on a client whose office is in an area where network coverage is spotty. If the sales force automation application is network-based, as in WAP and Web clipping, the agent may not be able to run it. At the all-important moment, she may have to revert to manual methods to do the sale paperwork, or she may not be able to close the deal at all, being unable to access the quote and shipping data the client requires.

If you've built the sales force automation application on the Palm OS, however, the agent can download or update pertinent information onto her handheld before she goes on the call. During her meeting, she can run the application locally, doing all calculations, generating quotes, purchase orders and other documents, and capturing the client's signature. Later, when she enters an area where wireless network coverage is available, she can touch a button and her handheld will automatically transmit the order information and complete the transaction.

Data interaction—Developers have the freedom and tools to create a fast, productive user experience. The Palm OS platform lets you create any kind of data interaction your applications require. It supports rich content display (menus, check boxes, icons and other graphics) and multiple input modes (touch screen, Graffiti® writing and fold-out and attachable keyboards).

Read more about the first Palm™ handheld with built-in wireless access

You can download the Palm™ VII white paper at:
<http://www.palm.com/pr/palmvii/7whitepaper.pdf>

A sales force automation application can speed quote creation and order entry by presenting users with product menus where they can quickly select model numbers, options and quantities. It can help agents sell by instantly displaying graphics showing customer-cho-

sen product configurations, and changing them in real time as customers consider alternatives. Customers can sign off on electronic orders that include corporate logos, mastheads and other official elements—or sales reps can generate hardcopy documents on a handheld printer.

The Palm OS® platform maximizes display flexibility by using intelligent compression to make the most of small-screen real estate. Menus and other interface elements can be hidden until needed; drill-down details just below the surface appear instantly with just a tap on the display.

Native Palm OS® applications run over many leading networks:

Mobitex: BellSouth Wireless Data Network
CDMA: Sprint PCS, Verizon
CDPD: AT&T Wireless
GSM: Vodafone, Orange, British Telecom

Palm OS® software development tools:

- Metroworks Code Warrior
 - NS Basic/Palm
 - OnTap
 - CASL Tools
 - Pendragon forms
 - Puma Satellite forms
 - PRC-Tools
 - GNU Tools
 - POA Builder
 - Bullet Proof J Designer Pro
 - Quartus Forth
 - Shareware Environments
-

Simplified development—Enterprises can build native Palm OS applications using existing programming talent and familiar tools. There are currently more than 7,000 applications available or in development for Palm Powered™ handhelds, including products from industry leaders such as Siebel Systems, Oracle and PeopleSoft. Palm™ has more than 120,000 registered developers worldwide and gains nearly 2,000 more each week. Numerous referenceable customers can demonstrate impressive returns on investments in 11 to 18 months.

The applications you build on the Palm OS platform run on all Palm Powered handhelds, either through built-in wireless connections, through expansion products such as wireless modems or through connections to other wireless handhelds such as cell phones. This user base represents nearly 80 percent of the handhelds in use in the U.S. and 75 percent of handhelds worldwide.

Your end-users can choose from a wide range of handhelds, including products from Palm and Palm OS licensees and OEMs such as Symbol Technologies, Kyocera, Handspring, Nokia, Sony, Franklin Covey, Supra Company and IBM. There are also some 500 expansion options, including the Springboard slot from Handspring, Compact Flash slots from TRG, snap-on wireless modems from Novatel, and soon Memory Stick and Secure Digital (SD) cards as well. Extension capabilities include not only wireless communications but pager cards, barcode scanners and memory.

While wireless networking is currently a sea of competing network protocols and service providers, Palm is committed to eliminating this concern for Palm OS developers. Native Palm OS applications currently run across Mobitex, Code Division Multiple Access

(CDMA), Cellular Digital Packet Data (CDPD) and Global System for Mobile Communications (GSM) networks, or any other data-capable wireless network.

The Palm OS® platform provides a disciplined, structured C/C++ development environment for building robust, complex applications simply, efficiently and fast. In fact, many developers, after trying to build mobile applications for non-Palm OS platforms, have chosen the Palm OS platform as the faster, more effective means of building viable enterprise solutions.

You can use XML to export content in an application-neutral form from legacy systems and transfer it across the wireless network. When the client-side application receives the data, it uses its own presentation language to display the content appropriately for the handheld.

Palm, Inc. provides a wide range of development resources, including the Palm OS Software Development Kit (SDK) and the Conduit Development Kit (CDK) for building conduits that do mirror-image synchronization, including import/export and data transport, with specific backbone enterprise systems. Palm™ also offers a wealth of Web clipping tools and an online Palm OS emulator for writing, testing and debugging applications on virtual handhelds.

Wireless security—Native applications incorporate state-of-the-art security methods for mobile handheld computing. Wireless Palm OS applications take advantage of Elliptic Curve Cryptography from Certicom Corp., which provides extremely high levels of security at small key sizes. You can also choose to build client authentication into native applications, further protecting mobile users, transactions and the network. In addition, dozens of third-party security products are available for handheld-level security (signature, password, key stroke), challenge response, and SSL, virtual private network (VPN) or leased-line access behind firewalls.

Future proofing wireless applications—Palm is a safe bet in the unpredictable wireless world. The Palm OS platform has a proven track record for upgradability, forward compatibility and investment protection over time. Going forward, Palm plans to develop once/run everywhere compatibility across all Palm Powered™ handhelds and all leading wireless networks. You can have confidence that your native Palm OS applications will benefit from the

most advanced networking technologies, such as fixed wireless LANs and Bluetooth personal area networks.

Palm's Commitment to Mobile Information Management

We are committed to building Internet access capability into Palm handhelds. An increasing number of new handhelds from Palm will have integrated wireless connectivity, and every existing Palm Powered™ handheld will have an easy way to add connectivity.

Today you can offer your users a choice of Palm Powered handhelds with built-in wireless communications, including the Palm™ VII and Symbol SPT 1700 handheld for data-only applications and the Kyocera pdQ cell phone for voice and data.

"The potential for worldwide wireless connectivity promises to elevate Palm-type handhelds from glorified day planners to the hub of all personal connectivity."

Information Week, 5/8/00

There are also a number of ways to provide wireless capabilities to users with other Palm Powered handhelds. Snap-on and plug-in wireless modems are available from third-party vendors such as Novatel, with its Minstrel III and V series CDPD wireless modems for the Palm™ III and V series handhelds respectively.

Two-piece solutions give handheld users wireless access through other handhelds. The Palm Mobile Internet Kit software, for example, enables users to connect their Palm handhelds to the Internet using the Sprint PCS network by connecting a cable from the handheld to a cell phone. In Europe and Asia a GSM phone can relay data from the wireless network to the handheld by IR beam.

Wireless Palm OS® and Web clipping applications currently run over leading circuit-switched and packet-switched networks in the U.S., Europe and Asia. Developers don't have to concern themselves with the idiosyncrasies of these networks; Palm makes them transparent by supporting multiple networks.

Palm Powered handhelds support a rapidly expanding range of wireless features. They work with leading servers and can perform HotSync® synchronization over wireless and wireline connections with either desktop PCs or network servers. Prebuilt conduits synchronize handheld databases with network servers for popular applications such as Microsoft Exchange, Lotus Notes, Lotus ccMail and Eudora. A Conduit Development Kit is available for creating additional conduits for synchronization with legacy applications of all kinds.

By offering this open, flexible architecture and working with a broad range of partners, Palm enables you to implement solutions suitable for practically any mobile computing environment (WANs, LANs, different geographies, different form factors, etc.). You can deploy wireless applications in multiple ways that suit a variety of mobile worker needs and create endless new wireless business opportunities.

Conclusion

The future of the Internet lies in mobile information management. A few years from now, most workers will be mobile. Most people will go online through wireless connections. Palm, Inc. is focused on developing the mobile information management solutions enterprises need to take their business into this new era of communications and competition.

Today, according to IDC, there are only approximately 5 million wireless-Internet subscribers worldwide. In just three years there will be 330 million, accounting for 55 percent of all Internet users. The implications of the shift underway from wireline to wireless access are far-reaching. After more than 8 million handheld shipments worldwide, Palm has learned that wireless Internet applications have little in common with their desktop predecessors. They're not only a horse of a different color, they're a whole new animal.

As an enterprise developer, you have probably begun to rethink fundamental assumptions: What kinds of information does the mobile workforce need? How do people prefer to access and work with information? We invite you to join us, together with more than 120,000 of the world's best handheld developers, in the Palm development community.

Resources for Wireless Enterprise Development

IT project managers and their development teams will find everything they need to get started with mobile information management at www.palmos.com. It's a comprehensive source for information, development kits and guides. You'll also find a Palm OS® emulator, which you can use to build and test applications on virtual Palm handhelds.

- **For general information about wireless technologies and trends**, see: <http://www.anywhereyougo.com>
<http://www.wirelessweek.com>
“Wireless in Cyberspace.” *Business Week Special Report*, 5/29/2000
“The Ripening of the Wireless Web.” *Business Week*, 6/26/2000
The Essential Guide to RF and Wireless. Carl J. Weisman, Prentice Hall PTR 2000
Understanding WAP. Van der Heijden & Taylor, Artech House, Inc. 2000
- **To learn more about Palm OS® technologies, including Web clipping**, go to <http://www.palmos.com/dev/tech/tech.html>
- **To find out more about developing wireless applications for Palm Powered™ handhelds**, go to the New Developer Guide at <http://www.palmos.com/dev/tech/new/>
- **To get information about the Palm HotSync® Server**, go to <http://www.palm.com/products/enterprise/server.html>
- **To search the Palm, Inc. Knowledge Base**, go to <http://oasis.palm.com/dev/kb/>
- **To access Palm OS development tools**, go to <http://www.palmos.com/dev/tech/tools/>
- **To browse or download documentation**, go to <http://www.palmos.com/dev/tech/docs/>
- **To join the Palm™ Solution Provider Program**, go to <http://www.palmos.com/dev/program/>

Glossary

Bluetooth An emerging protocol for personal area networking.

CDMA Code Division Multiple Access. A networking protocol used in digital cellular phone technology from Kyocera (formerly Qualcomm) and adopted by Sprint PCS and Verizon network services.

CDK Conduit Development Kit. Tools for building conduits that synchronize data on handhelds with desktop or network databases.

CDPD Cellular Digital Packet Data. A digital wireless network protocol. Usually deployed as an enhancement to existing analog cellular networks. Used by AT&T Wireless services.

ERP Enterprise resource planning. General term used to refer to legacy corporate backbone applications covering broad functional areas such as manufacturing, inventory management and financial management.

Fixed wireless LAN A point-to-point wireless transmission protocol, as in the IEEE 802.11 standard.

HDML A precursor to WAP, for writing applications that enable cell phones to access the Internet.

HTML Hypertext Markup Language. The universal presentation language standard on the World Wide Web.

Graffiti® software A fast input mode using a stylus to do short-hand-style writing on Palm Powered™ handhelds.

GSM Global System for Mobile Communication. The current wireless standard in Europe, a variant of Time Division Multiple Access (TDMA).

Mobitex A wireless packet data network from BellSouth Wireless Data.

Palm HotSync® Server A synchronization server software from Palm, Inc.

PAN Personal area network.

SDK Software Development Kit. Tools for building native Palm OS® applications.

SSL Secure Sockets Layer. The leading security protocol on the Internet.

VPN Virtual private network. A route public network that is configured to provide point-to-point-like private connections, usually using a technology called “tunneling.”

WAP Wireless Application Protocol. An emerging protocol for wireless networking, developed mainly for cell phones.

Web clipping A technology from Palm, Inc. for writing handheld applications that efficiently access content from Web servers.

WML Wireless Markup Language. The language used to write WAP applications.

WTLS Wireless Transport Layer Security. An emerging protocol that provides the security layer of WAP.

XML Extensible Markup Language. A specification designed specifically for Web documents that allows designers to create customized tags.



Palm, Inc.
5470 Great America Parkway
Santa Clara, CA 95052
www.palm.com

Copyright © 2000 Palm, Inc. All rights reserved. Graffiti, HotSync and Palm OS are registered trademarks and Palm, Palm Source, the Palm logo, Palm Powered, Palm.net and the Palm trade dress are trademarks of Palm, Inc. or its subsidiaries. All other products and brand names may be trademarks or registered trademarks of their respective owners. All specifications are subject to change without notice.

PP WWP 1200