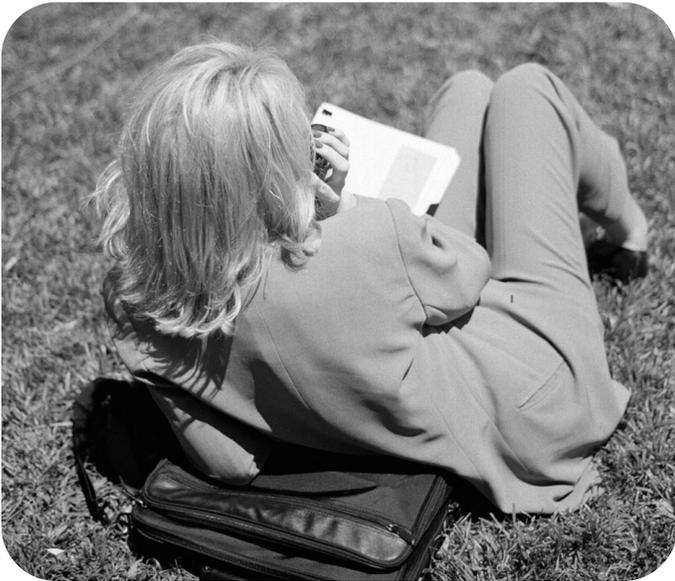


HP e3000: entering the wireless Internet

#101

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accessing information anywhere, at anytime

With the advent of the Internet, many companies have transformed their business and changed their operating environment. The Internet has become a 24-hour place for information exchange, e-services and e-commerce. At the same time, mobile phone usage around the world is exploding. In many European countries, about half of the population currently owns a mobile phone. The Strategis Group predicts that the worldwide mobile hand-set market will double to three billion phones by 2005. Many mobile users not only make phone calls but also desire services like banking, stock trading, news, e-mail, bookings, traffic information, and shopping from their mobile phones. To be competitive, companies face the increasing challenges of supporting a growing mobile workforce, and making their business available whenever and wherever to their customers. The demand for accessing information from "anywhere, at anytime" is growing rapidly. IDC predicts that by the end of 2002, there will be more wireless subscribers capable of Internet access than wired Internet users. Forrester analysts also predict that by 2003, 45% of online users will connect to the Internet via more than one device. The Internet and the mobile world are converging at an astonishing speed. Mobile Internet connectivity will soon become the next wave of the new economy.

anywhere,
at anytime

the landscape of the mobile internet

Mobile Internet technologies make it possible to serve Internet content and to perform e-services from mobile devices such as mobile phones and handheld devices. Major European and Asian companies have mobilized their businesses today. The American mobile market still lags behind these countries. One of the major reasons for this lag is that most US users are accustomed to the desktop PC monitor, so the experience of a small screen from a mobile phone or a PDA is not as appealing when compared to a PC monitor. With the benefits of accessing information at your fingertips anytime and anywhere, the adoption of the wireless Internet by US users is simply a matter of time.

The Internet in general is not suited for the mobile environment because the infrastructure is too complex and requires too much bandwidth. The current wireless networks have less bandwidth, more latency, and less connection stability. Moreover mobile devices have their constrained environments because of a smaller display, low memory, less CPU power and limited battery power. A Web page generally would not fit on the small screen of an average mobile phone. Since there is no keyboard on a mobile phone, it would be harder to enter information from a keypad. Therefore, new protocols were developed to overcome these limitations. Back in 1995, the US Unwired Planet (Unwired Planet became Phone.com, which has recently merged with Software.com to become OpenWave) introduced HDML (the Handheld Device markup language) that allows only the text portions of Web pages to be displayed on the mobile phone and PDA via wireless access. This eventually evolved into the WAP (Wireless Application Protocol) specifications and a new wireless markup language (WML). In Japan, NTT DoCoMo introduced i-mode service that allows mobile phone users to access the Internet. Also SMS (Short Messaging Service) was created as part the phase 1 GSM (Global System for Mobile Communications) standard.

SMS

SMS (Short Messaging Service) is the technology that allows text messages to be received and sent over mobile devices. SMS allows users to directly transmit messages to each other without the use of an operator. SMS messages can be up to 160 characters in length. SMS is very popular in Europe, the Middle East, Asia, and in some parts of North America.

“i-mode”

“i-mode” (information mode) is a wireless technology that enables users to access Internet services from their mobile phones. “i-mode” is based on the packet-data transmission, which is always online and constantly connected to the Internet. Users are only charged with a low monthly fee, and for the data that is downloaded from the Internet, rather than the time they consume. “i-mode” uses a “compact” form of HTML “cHTML”, which is a scaled down version of HTML 4.0.

The “i-mode” service was first introduced in Japan in Feb 1999 by NTT DoCoMo, and currently has over 18 million subscribers becoming one of the world’s most successful services offering wireless web browsing and e-mail. “i-mode” is a closed standard and controlled by NTT DoCoMo. Up until now, i-mode service is mainly offered on NTT DoCoMo’s Japanese networks. NTT DoCoMo has been aggressively expanding their service to Hong Kong, China, Europe and North America. NTT DoCoMo has recently invested and owns a minority stake in the network operator companies AT&T Wireless in the United States, Dutch-controlled KPN Mobile in Europe, Hong Kong-based Hutchison Telecom and Taiwan’s KG Telecom. NTT DoCoMo and its “i-mode” technology are emerging as significant worldwide forces in the wireless Network.

WAP

WAP (Wireless Application Protocol) is an open standard that allows mobile devices to access information from the Internet. WAP uses WML as its markup language and a corresponding scripting language called WMLScript.

WAP is designed to be network independent and operable on various mobile technologies. WAP currently works over the circuit-switched networks such as CDPD, CDMA, GSM, PDC, PHS, TDMA, FLEX, ReFLEX, iDEN, etc. The circuit-switched networks connect mobile devices via dedicated lines. The lines remain tied up for as long as users maintain the connection. As a result, the users are charged with the connection time. WAP will continue to work with future networks such as GPRS and 3G, the 3rd generation wireless. WAP is widely used around the world especially in Europe.

WAP was developed and is driven by the WAP Forum, a group originally formed by Nokia, Ericsson, Motorola and Phone.com in 1997. The WAP Forum now has over 500 member companies who make up 95% of handset manufacturers, carriers, computer giants, infrastructure providers, and many other companies providing solutions in the wireless space. WAP is contin-

uously evolving. In May 1998, the WAP Forum published the WAP 1.0 specification. WAP 1.1 was announced June 30, 1999. In December 1999, WAP v1.2 was ratified. The next generation of WAP 2.0 specification will support xHTML (Extensible Hypertext Markup Language).

J2ME

Sun has separated the Java™ technologies into three editions: Micro (J2METM), Standard (J2SETM), and Enterprise (J2EETM). J2ME specifically addresses the consumer electronics and embedded devices such as mobile phones, PDAs, digital television set-top boxes, etc. The J2ME Platform consists of a virtual machine and a set of APIs specified in “Configuration” documents, plus application- and market-specific “Profiles” built to sit on top of an underlying configuration.

J2ME-based devices such as mobile phones are beginning to surface in the market. Network operators are starting to deploy the technologies to support downloadable Java code to devices. Motorola will have iDEN phones supporting J2ME very soon. Many mobile phone companies providing handsets to NTT DoCoMo will be providing J2ME-powered phones for their i-mode service in the coming months.

converging technologies

Many believe that the WAP and “i-mode” standards will converge in the near future because they are essentially similar technologies allowing the user to access Web based information with transactional capabilities from a mobile phone. Various activities has begun to integrate i-mode and WAP such as evolving WAP 2.0 to adopt i-mode services, implementing cHTML on top of WAP protocols, migrating both WAP and i-mode towards xHTML-based technologies. The main focus of this paper is WAP technology.

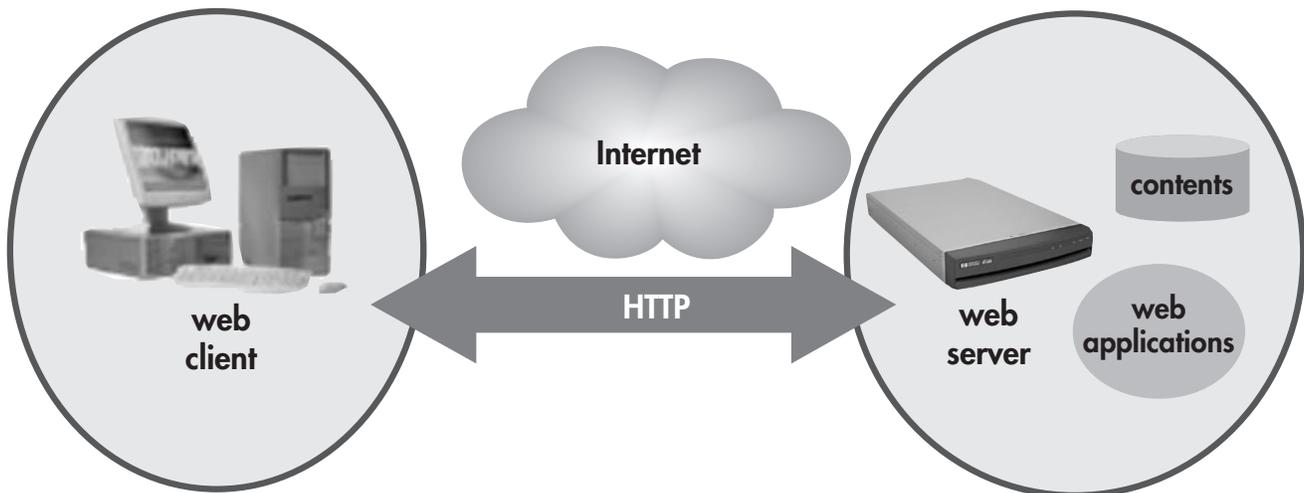


WAP technical background

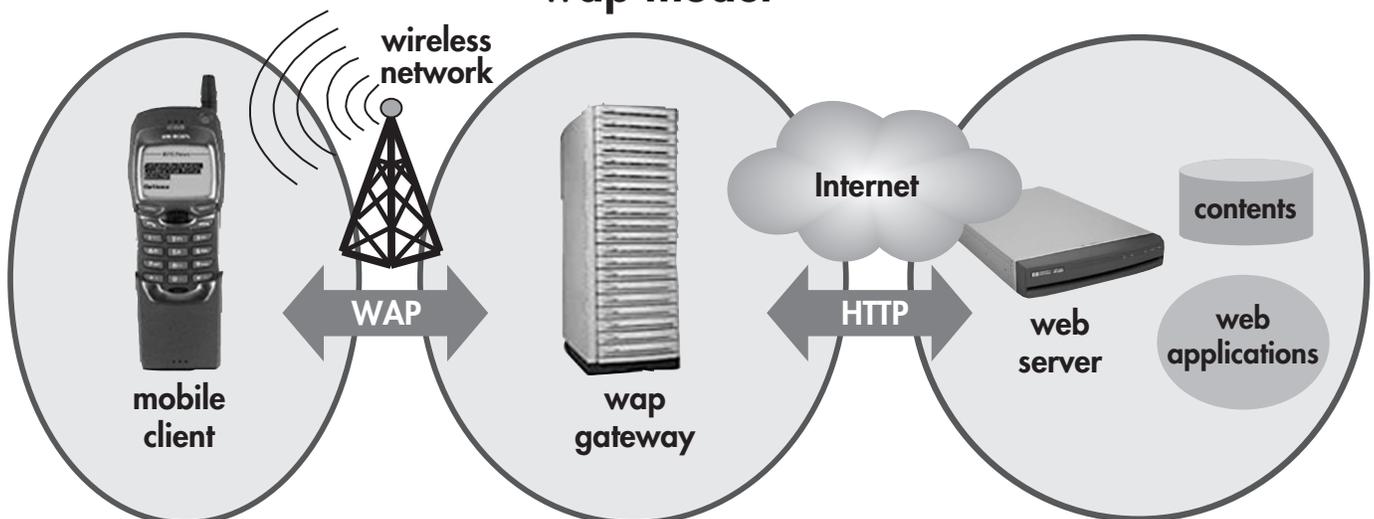
WAP is based on the Internet technology and uses many standards such as HTTP, XML, UDP and IP, but has been optimized for the constraining environment of a mobile device. WAP utilizes the underlying Web structure such as Web server to provide contents to the Internet and leverage the existing application development environment such as CGI, JAVA, Servlets, ASP and PHP technologies.

WAP was developed to closely follow the Web architecture - the client/server model. The main difference between the WAP and the Web is the new element, a gateway or proxy server. The mobile client (mobile phone) sends requests to this gateway, and the gateway in turn makes requests to the server on the mobile client's behalf. The gateway acts as the interpreter in the conversation between the server and mobile client translating between WAP and HTTP.

web model



wap model



WAP stack

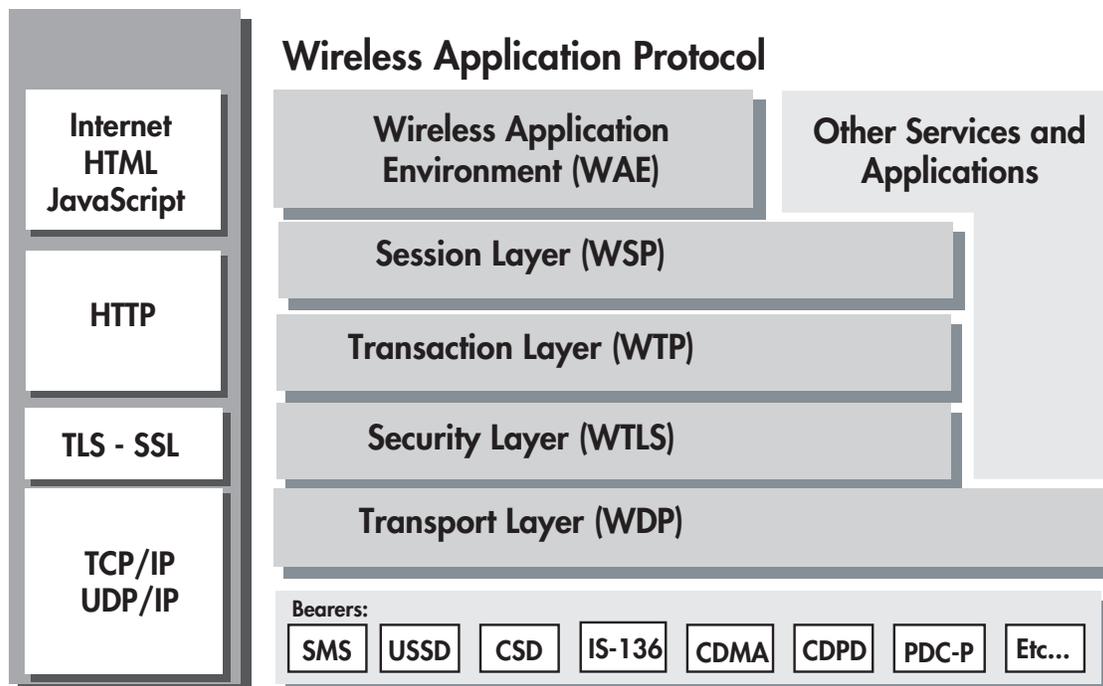
The WAP stack is a lightweight protocol stack implemented in a layered approach. It has many similarities to the Internet stack. For instance, the Wireless Markup Language (WML) used to create WAP pages are very similar to HTML used to create Web pages. Similarly, WMLScript is based on JavaScript. The lower parts of the stack (e.g. WSP and WTP) are similar to the Internet protocol such as HTTP.

- Application Layer. WAE (Wireless Application Environment) is the top layer, which provides an environment for the development and execution of the WAP applications. It mainly consists of the WML, WMLScript and the Wireless Telephony Application Interface (WTA).
 - WML is similar to HTML based on XML. WML is used to create pages to be displayed in a WAP browser. Pages in WML are called DECKS. DECKS are constructed as a set of CARDS. A set of WML tags is provided, allowing a range of interfaces to be created and shown on WAP devices.
 - WMLScript is a JavaScript-like client side scripting language in WML pages and is used to run simple code on the WAP device. Unlike JavaScript, WML scripts are not embedded in the WML pages. WML pages only contain references to the script URLs. The WAP browser needs to request the server to download the code into the memory and run it. WML script is compiled into byte code on a server before it is sent to the WAP browser.

– WTA specifies how WAP applications can access mobile phone functionality.

- Session Layer. WSP (Wireless Session Protocol) is the interface between the application layer and the transaction layer. It delivers all functions that are needed for wireless connections such as starting a session, transferring information back and forth, and ending a session.
- Transaction Layer. WTP (Wireless Transaction Protocol) mainly provides services to various unreliable and reliable requests. The WTP and WSP together provide functionality equivalent to that of HTTP.
- Security Layer. WTLS (Wireless Transport Layer Security) is an optional layer based on TLS v.1.0 (Transport Layer Security) to provide secure communication and authentication.
- Transport Layer. WDP (Wireless Datagram Protocol) is the WAP equivalent of UDP. (There is no WAP equivalent of TCP). WDP enables a mobile device to transmit and receive data with many types of mobile communication networks or "bearers" and acts as an interface between the bearer networks and other layers of the WAP stack. This allows WAP applications to transmit data transparently over different bearer services such as GSM, USSD, CSD, CDMA, CDPD, PDC-P, etc.

comparison between Internet and WAP technologies



how does a mobile phone connect to the Internet?

To connect a mobile phone to the Internet, it requires several key components: an WAP-enabled phone, a service plan from a wireless carrier, a WAP gateway and a web server that provides the WAP content.

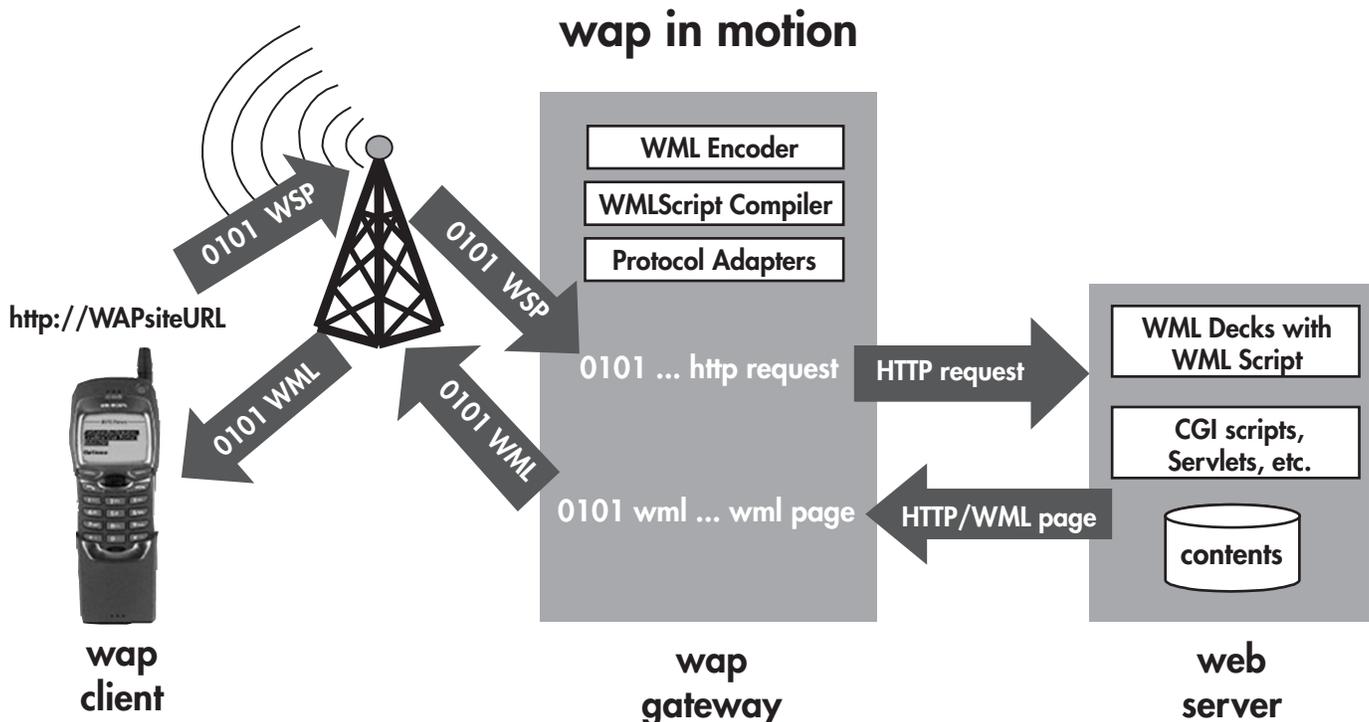
- A WAP enabled phone, or WAP phone is built with WAP technology including a WAP browser (microbrowser). A WAP browser is a small piece of software with minimal demands on memory and CPU. It can display information written in WML and interpret WMLScript. Many mobile phone manufacturers such as Nokia, Ericsson, Motorola, and Siemens are already offering WAP-enabled phones.
- You need a wireless service for a WAP phone to communicate with the mobile network and to establish a connection with the WAP gateway. A mobile network carrier allows you access to its wireless network through a service plan. It is important to make sure that your WAP phone is compatible with your carrier's network because it usually works on one system but won't work on the other. You usually buy the WAP phone at the same time you sign up for a service plan.
- A WAP gateway forms a bridge between the Internet and wireless networks and acts as an "interpreter" between them. The gateway translates the WAP request into an HTTP request and forwards it to the web server. The gateway receives the response on behalf of the WAP phone. WML and WMLScript

get encoded into binary data, which is then passed back to the WAP phone. The WAP phone reads the binary WML and displays it to the user. The WAP gateway is usually provided by your carrier and resides within your wireless carrier's network.

- A Web server provides WAP content. You need to configure your Web server to serve WML pages and not HTML pages. We will discuss this later in more detail.

how does it really work?

- The mobile user enters the URL of a web server into the phone
- The phone converts the text URL into a binary WSP request and sends the request to the WAP gateway using WSP protocol
- Data travels from the WAP phone to a receiving station. The receiving station then connects into a central system that connects to the standard telephone system
- The gateway receives the binary WSP request and converts it to an HTTP request
- The gateway sends the HTTP request to the Internet
- The Web server handles the request just like any other HTTP request. It returns a WML page back to the gateway using standard Web techniques such as CGI or servlets.
- The gateway converts the WML page to binary WML
- The gateway sends the binary WML using WSP protocol
- The phone converts binary WML to text WML and displays it using the microbrowser.



how secure is WAP?

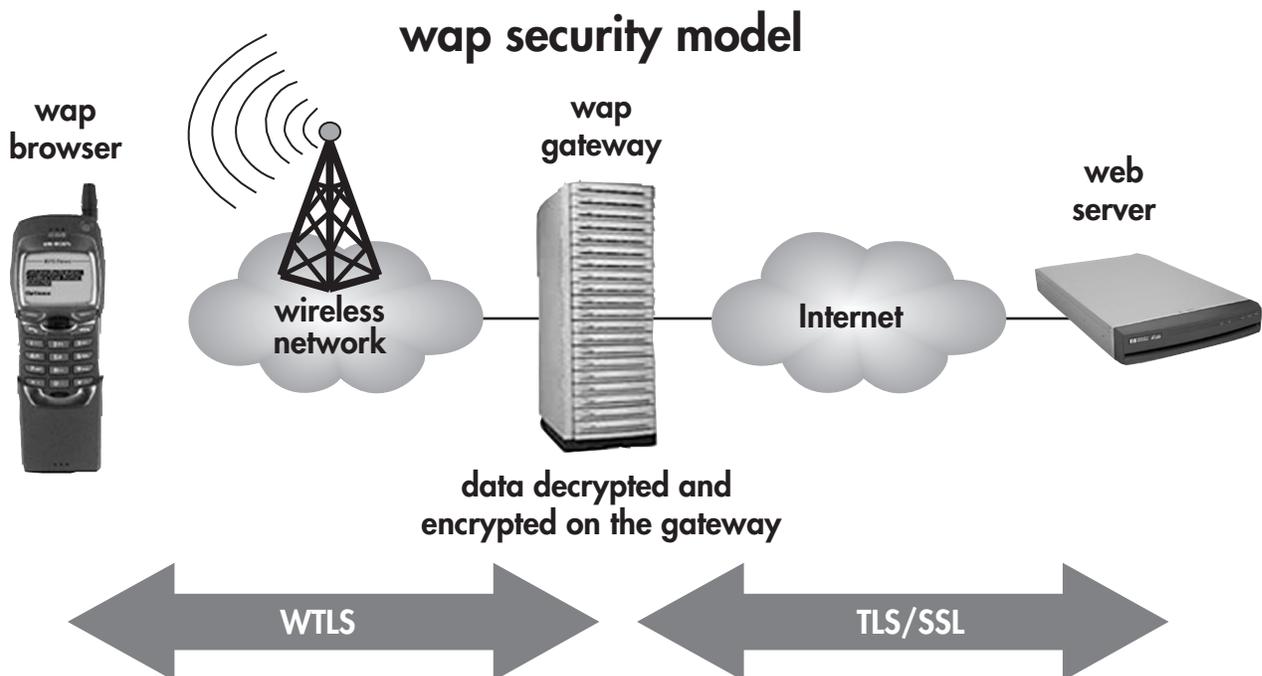
The current WAP security model is divided into 3 parts, as shown in the figure below. On the right, TLS/SSL is used to ensure secure communication between the Web server and the WAP gateway. On the left, the WAP gateway uses WTLS to communicate securely with the WAP device. However, there is a potential security problem where the two protocols meet, and that's inside the WAP gateway. TLS/SSL is not directly compatible with WTLS; so the WAP gateway must decrypt the TLS/SSL protected data coming from the web server and then re-encrypt it using WTLS before passing the data on to the WAP device. Inside the memory of the WAP gateway, the data is clear and unprotected.

In most cases, the WAP gateway resides within the wireless carrier's networks, since encryption does not take place on an end-to-end basis, the security is therefore at risk within the WAP gateway. It may not be acceptable by the application providers who provide sensitive data such as the credit card number and bank account information. Many major WAP players offer various solutions to address this problem. The common solution is to host the WAP gateway inside the corporate fire-wall. However, WAP gateways were designed to operate in the mobile carrier's networks. If the WAP gateway is placed in a private network, it requires users to set up gateway configurations on the mobile devices, and they have to switch configurations every time they need to access a different WAP site.

The WAP specification also defines an optional tamper-resistant module, called the WAP Identity Module (WIM). WIM can be used to store and process sensitive information needed for user identification and authentication, and the data never leaves the WIM. The WIM can be implemented by the same physical device that implements the Subscriber Identity Module (SIM) in GSM phones.

The WAP Forum is actively working on the end-to-end security standards. Recently, they just include new specifications that provide end-to-end encryption and the wireless PKI (Public Key Infrastructure).

On the other hand, i-mode has successfully implemented TLS in a wireless environment. Many believe that over the long term, mobile security will depend on smart cards, wireless enabled public key infrastructures (PKIs) and ultimately there will be a convergence between the wired and wireless protocols: IPSec, TLS/SSL and WTLS.



WAP-enabling your hp e3000

configuring your MPE/iX web server

The HP WebWise Secure web server and the standard Apache Web Server for MPE/iX are capable of delivering WAP content on the HP e3000. You can configure the web server to do this. When you access a web page, the Web server tells your browser what kind of document to expect. When the browser receives the document from the server, it checks the MIME type to decide what to do with the document. Normally, the file extension of a document is associated with a MIME type, so the web server can automatically issue the correct MIME type. The MIME type for 'regular' web pages usually is "text/html". However, a WAP browser cannot read HTML. To enable your web server to serve WAP documents, you need to add new MIME types. This can be done through adding the following new MIME types to the configuration file httpd.conf or the .htaccess file, which usually resides in the directory tree of the WML files.

```
AddType text/vnd.wap.wml .wml
AddType application/vnd.wap.wmlc .wmlc
AddType text/vnd.wap.wmlscript .wmls
AddType application/vnd.wap.wmlscriptc.wmlsc
AddType image/vnd.wap.wbmp .wbmp
```

In the statement above, we have told the web server to deliver MIME type text/vnd.wap.wml whenever the filename ends in the extension .wml. Similarly, the .wmlc files would be compressed WML files, while .wmls and .wmlsc represent WMLScript and compressed WMLScript, respectively. Furthermore, .wbmp files represent wireless bitmap files or WBMP, the graphic format that wireless devices support (as opposed to, for example, .gif or .jpg on desktop browsers).

The .htaccess changes take effect immediately. However, changes to the httpd.conf configuration file take effect only when the server is restarted. Once done though, your e3000 web server is ready to go, and will deliver WML and related files to a wireless device.

how do I get started?

- You do not have to buy a WAP phone to start working with the WAP. There are many great WAP development toolkits and online WAP testing tools available. Some WAP toolkits can be downloaded from the Web. Most toolkits come with a phone simulator, WML & WMLScript templates and examples. Here are some popular links for the WAP development tools:
 - Speedware MobilDev at http://mobiledev.speedware.com/download_center/
 - Anywhereyougo online testing lab at <http://www.anywhereyougo.com/ayg/ayg/WapWanderer.po>
 - Phone.com's SDK at <http://developer.phone.com>
 - Nokia WAP Developer Toolkit at <http://www.nokia.com/corporate/wap/sdk.html>
 - Ericsson SDK at <http://www.ericsson.com/developerszone/>
- Write your first "HP e3000 Wireless" WAP Application. On the following page is a simple WML sample code 'index.wml' invoking a CGI script 'listuser.cgi', which executes a MPE 'listuser' command. To serve this WAP page, you need to save the wml file in the document root of your Web server, htdocs directory, and the CGI script 'listuser.cgi' under the cgi-bin directory.

Note: since there are many WML developer guides, reference manuals and tutorials available online, the following example is simple enough that we will not discuss the detail here.

index.wml sample code

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.1//EN"
    "http://www.wapforum.org/DTD/wml_1.1.xml">
<!-- Main menu for WML examples -->

<wml>
  <card title="HP e3000 Home Page">
    <p>HP e3000 Wireless<br/>
    <a title="About" href="#whatis">About e3000? </a><br/>
    <a title="Examples" href="#apps">MPE Examples </a><br/>
    </p>
    <do type="options" label="e3000">
      <go href="/index.wml"/>
    </do>
  </card>

  <card id="whatis">
    <p>
    This is an HP e3000 running on MPE/iX 6.0. The Web Server here now supports WAP contents!
    </p>
    <do type="options" label="e3000">
      <go href="/index.wml"/>
    </do>
  </card>

  <card id="apps">
    <p>
    MPE Example Apps <br/>
    <a title="listuser" href="/cgi-bin/wap/scripts/listuser.cgi":listuser </a><br/>
    <a title="listgroup" href="/cgi-bin/wap/scripts/listgroup.cgi":listgroup </a><br/>
    <a title="showtime" href="/cgi-bin/wap/scripts/showtime.cgi":show time </a><br/>
    <a title="showme" href="/cgi-bin/wap/scripts/showme.cgi":showme</a><br/>
    <a title="showjob" href="/cgi-bin/wap/scripts/showjob.cgi":showjob </a><br/>
    </p>
    <do type="options" label="examples">
      <go href="index.wml"/>
    </do>
  </card>

</wml>
```

listuser.cgi sample code

```
#!/bin/sh
a=`callci listuser | cut -c1-20`

cat - <<EOF
Content-type: text/vnd.wap.wml

<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//WAPFORUM//DTD WML 1.1//EN" "http://www.wapforum.org/DTD/wml_1.1.xml">

<wml>
  <card>
    <do type="accept" label="back">
      <go href="../../../../index.wml#apps"/>
    </do>
    <do type="options" label="e3000">
      <go href="../../../../index.wml"/>
    </do>
    <p>${a}</p>
  </card>
</wml>
EOF
```

- Next, make sure that your e3000 Web server is configured to serve WAP pages as mentioned in the previous section.

If you already have an existing HTML home page on your web server, and you want to add a new WML home page, you now have two URLs for your Web user to remember. It is possible to use the same URL `http://www.yourhost.com` for both HTML and WML home pages by redirecting the request to the appropriate documents. You can write a CGI script checking the value of `$HTTP_ACCEPT`, one of the CGI standard environment variables which is set to the MIME types that the browser can accept. The redirection would send the browser to the appropriate URL. The script could be expanded to check which phone/browser is being used and to direct the user to the appropriate page. This can be done by checking the value of `$HTTP_USER_AGENT`. You also need to add the script to 'DirectoryIndex' directive, in the web server configuration file and restart the web server to make it works.

DirectoryIndex cgi-bin/redirect.cgi index.html

The following is an example of a Perl CGI script `redirect.cgi` that redirects the request to the appropriate HTML or WML home page.

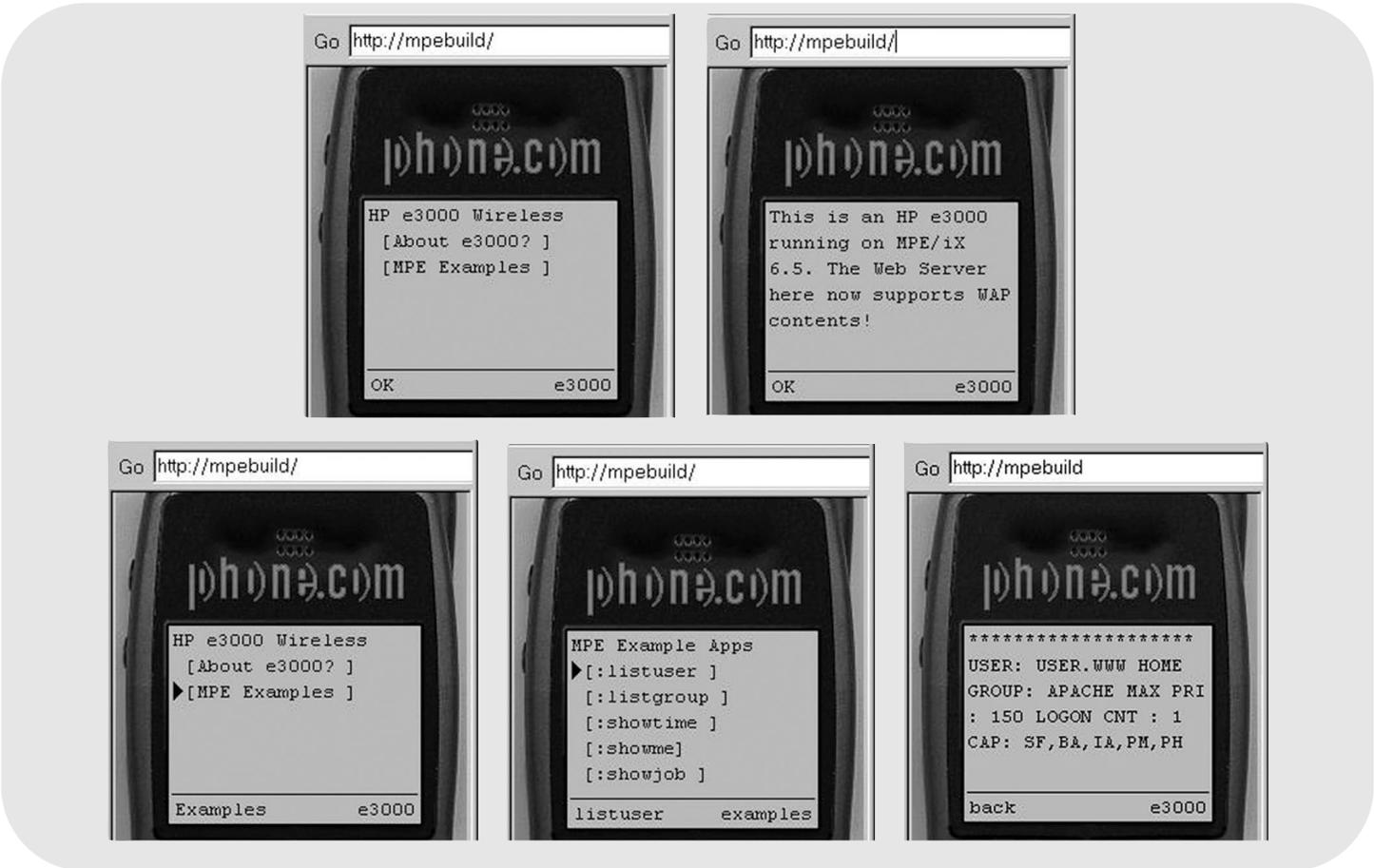
redirect.cgi sample code

```
#!/usr/local/bin/perl
$accept = $ENV{"HTTP_ACCEPT"};
$agent = $ENV{"HTTP_USER_AGENT"};

$accept =~ tr/A-Z/a-z/;
$agent =~ tr/a-z/A-Z/;
$host = "mpehost";

if ( ($accept =~ "vnd.wap.wml") || ($accept =~ "vnd.wap.wmlscript") ) {
    print "Location: http://$host/index.wml", "\n\n";
    exit(0);
} else {
    if (
        $agent =~ "ALAC" ||
        $agent =~ "AUR" ||
        $agent =~ "ERIC" ||
        $agent =~ "MC21" ||
        $agent =~ "JAVA" ||
        $agent =~ "MC21" ||
        $agent =~ "MITS" ||
        $agent =~ "MOT-" ||
        $agent =~ "NOKI" ||
        $agent =~ "QWAP" ||
        $agent =~ "R380" ||
        $agent =~ "UP" ||
        $agent =~ "WAPA" ||
        $agent =~ "WAPI" ||
        $agent =~ "WAPJ" ||
        $agent =~ "WINW"
    ) {
        print "Location: http://$host/index.wml", "\n\n";
        exit(0);
    } else {
        # Not a WAP browser (HTML)
        print "Location: http://$host/index.html", "\n\n";
        exit(0);
    }
}
```

- You can test your WAP application using a phone simulator that runs on your desktop. This allows you to save airtime spent with a real WAP device. You simply type in a URL, like requesting a conventional Web page. The following figures show the output of the 'index.wml' and the listuser.cgi output loaded into a microbrowser using the phone.com simulator.



When deploying your WAP application, you should test your applications on a WAP enabled phone. The more devices you test them on, the better. Several partners have successfully implemented wireless solutions on the HP e3000. Please see Appendix for some of their hp e3000 wireless stories.

constantly evolving

Mobile Internet access has become a reality. It allows consumers to access services such as stock quotes, news, banking, retail, games and ticketing. More importantly, mobile Internet enables mobile worker and customers to access corporate networks and business critical information anytime and anywhere. HP e3000 has evolved into the mobile Internet world and so can you and your business.

The WAP is constantly evolving. The new release will contain additional measures to assure highly secure transactions, including end-to-end security and support for PKI. The next generation of WAP will include the new markup language xHTML and multimedia. The web is also evolving rapidly to support many diverse mobile devices beyond PC desktops. The convergence of Web technology, wireless networks, and mobile devices creates a new class of user, the mobile user. Many companies have started to capitalize on this huge opportunity of mobile Internet market. It is clear that we are heading toward a new era of the Information Appliance - where everything will be connected and linked to the Internet. HP e3000 is a serious Internet player and is ready to play a key role in this rapid changing world of Information Appliance.

appendix: hp e3000 wireless Internet success stories

Ecometry International Wireless Application Protocol (WAP) Module



I. Introduction

In today's business world, companies are forced to become more competitive in order to survive and react to changes in customer behavior. One of the most recent and significant changes in the business environment has been the growing demand for mobility. This means that customers and employees need to be able to access information and services at any time, no matter where they are.

Instead of doing all of your online shopping while hunched over a PC, why not do it over the phone? Personalized shopping and information services coming straight from the Web to your mobile phone is finally becoming a reality. Globally, three times as many users have adopted mobile phones as have adopted the Internet. With phones there are no wires, and they give your customers and workers the freedom to access information anytime, anywhere, and they are affordable. Imagine if you had the ability to make a selection from your customer database and send out a broadcast phone mailing with the offer of the day. This functionality allows for immediate market sampling and the ability to broadcast offers where the whole campaign could be over in a matter of days. Imagine the ability to make an offer to your customers within the same working day without incurring printing or postage costs. A simple phone call places a real-time offer in your customer's hand.

II. Background

Mobile phones have become increasingly popular in recent years and these days they are really communication devices capable of running applications and communicating with other devices and applications over a wireless network. According to Global Mobile Magazine, there are more than 200 million wireless subscribers in the world today and it is predicted that there will be more than 530 million wireless subscribers by the year 2001. New estimates report that the number of wireless subscribers will break the one billion mark by 2004, and a "substantial proportion of the phones sold that year will have multimedia capabilities". These capabilities will include being able to retrieve E-mail, and push and pull information from the Internet.

III. WAP

Wireless Application Protocol (WAP) is the world Internet standard for transferring Internet content to mobile phones and palmtop computers. It allows the recently launched WAP mobile phones to browse the Internet.

The WAP interface to Ecometry International utilizes the Ecometry International / Webrequest HP listeners. These listeners process the various data requests and transactions that link Ecometry International to the back-end system. The WAP interface makes a subset of this functionality available to owners of GSM mobile phones and other WAP-enabled devices. Users can search for products, check availability and prices, and make purchases, all from their handset.

Many applications on the Web today require a secure connection between the client and the application server. The WAP specification ensures that a secure protocol is available for these transactions on a wireless handset. The Wireless Transport Layer Security (WTLS) protocol is based upon the industry-standard Transport Layer Security (TLS) protocol, formerly known as Secure Sockets Layer (SSL). WTLS is intended for use with the WAP transport protocols and has been optimized for use over narrow-band communication channels. WTLS ensures data integrity and privacy. Since Ecometry International employs the standard Internet security techniques with TLS, the WAP Gateway automatically and transparently manages wireless security with minimal overhead.

In addition, Ecometry International/WAP provides the ability to send broadcast SMS messages (short messages) to many customers simultaneously. The obvious advantage to SMS messaging rather than traditional mailing methods is that the response is immediate. Customers can be presented with a yes / no response to the offer of the day.

Ecometry International/WAP is a completely separate entity to all other Ecometry International implementations. It was developed using the Ecometry International SDK (Software Developers Kit) as a reference and therefore does not depend on, or require any modification to, the existing code. It is based on an object-oriented model that abstracts the complexities of the system from the programmer. For example, objects such as Item, Cart, Order, Customer and Session already exist and can easily be used to retrieve information. These objects allow a programmer to forget about the actual mechanics of the transaction and concentrate on the coding.

IV. Who Owns WAP

WAP is an international standard - albeit that it is not yet regulated by a standards body. HTML, along with the Internet in general, is regulated by the World Wide Web Consortium (www.w3.org). WAP on the other hand is developed and standardized by an industry body with 200 global affiliates, the WAP Forum (www.wapforum.org). WAP version 1.1 is the current standard and WAP version 1.2 is due for imminent release.

V. What Services Can Be Provided Today

The first few months of 2000 have seen European mobile networks team up with handset manufacturers to distribute basic WAP phones and standards. Pilot schemes include: online bank account management, online financial market news, frequent flyer flight bookings and real-time mail order purchasing.

VI. Using Existing Web Content Over WAP

It is not yet possible to easily use existing content as the content needs to be reformatted. The reformatting takes the form of WML, Wireless Markup Language, which is similar to HTML but handles only text. However, you do not need to have two separate URLs as it is possible to determine whether a user has hit your site using a mobile phone or a PC, and direct their query to the relevant version of the content. Another content issue is Java. Java scripts are used to make HTML pages interactive. A similar scripting language exists called WMLScript, but these scripts currently sit outside the main Web page and have to be accessed separately.

The World Wide Web Consortium is working on a future markup language called eXtensible Style Language, that would allow a one off generation of content via XML, which is then filtered towards WML, HTML and hard-copy output.

VII. Opening New Channels

More customers, different behavior. Today, e-commerce relationships are shaped by the way PC's access the Web. Mobile phones are private and non-static - they allow anytime, anywhere access to your customer or prospect. Unlike a PC, a mobile phone is always on or about to be switched on by the end-user. True one-to-one communication, or simply tomorrow's method of accessing your offering, today.

With the addition of WAP technology to it's core e-commerce product range, Smith-Gardner is continuing to demonstrate its commitment to be at the forefront of technology in providing multi-channel access capabilities to your products.

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HostAccess Wireless solutions from Pixel

HostAccess Wireless solutions from Pixel Now that the wireless interfaces have been defined and become standardized, the problem now turns to knowing how to get live information out of the Legacy system. Accessing the files of the application provides one solution, but often, the applications green screens are the only way for getting real transactional data in and out of the HP e3000 or other Legacy systems. Imagine treating your HP e3000 screens as a data source where accessing as much or as little data as you need to build new WAP applications is the easy part; that is exactly the capability provided by Pixels HOSTACCESS products.

Pixels HOSTACCESS Server product sits between the HP e3000 and the WAP server (see figure 1). HOSTACCESS Application Navigator is used to teach, in advance, how to automatically navigate your HP e3000 green screens and which green screens you would like to extract the data from.

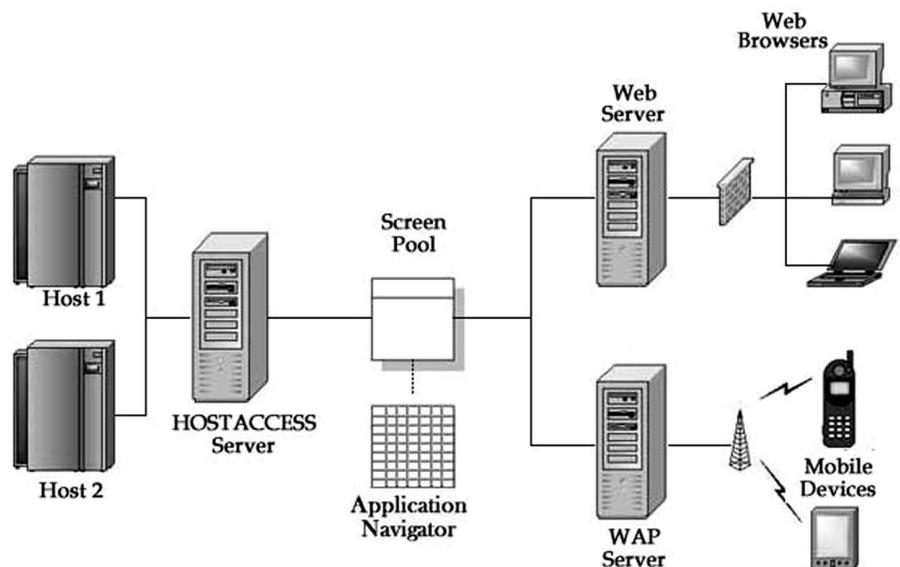
The HOSTACCESS solution allows you to rapidly leverage your existing application data and turn it into Ebusiness assets that can be delivered anywhere. Extending the reach of the data stored on the HP e3000 is essential if HP e3000 users which to rapidly move into the WAP and Web environments.

Pixel is a leading Host Integration company with over 1.3 million users sold in over 50 countries worldwide. Pixel recognizes the need of businesses to rapidly integrate data that forms the backbone of their organization into a variety of wireless applications. Pixel has successfully partnered with a number of companies specializing in specific vertical and horizontal solutions combining the best of breed products.

Healthcare.com Inc., a major integrator in the healthcare market has recently signed an OEM license for Pixel's HOSTACCESS WAP technology to deliver a variety of wireless healthcare solutions. Veriprise Wireless Inc., has recently signed a strategic alliance with Pixel. Veriprise is a wireless software development and solutions company that is extending business applications, such as those on the HP e3000, to wireless devices.

About Pixel Group

Founded in 1988, Pixel is a worldwide provider of Enterprise Application Integration (EAI) solutions allowing organizations to extend the reach and life of their business critical host based legacy systems. Pixel's proven HOSTACCESS(r) solutions allow customers to rapidly and non-invasively solve all of their e-business requirements including web enabling, wireless deployment, rejuvenation, extension and remodeling for every different type of legacy system in use today. Pixel has licensed over 1.3 million copies of connectivity software to thousands of organizations in over 50 countries throughout the world. Pixel sells its products, consulting and support services globally both directly and through a worldwide partner program.



wireless solutions for the hp e3000



Speedware helps your company exploit the opportunities of the wireless Internet with the tools, expertise and revolutionary mobile applications that empower your customers, partners and employees.

Speedware continues to evolve with the HP e3000 by providing customers with over 25 years of expertise in building innovative IT tools and solutions. Speedware has always supported the latest technology trends and continues to do so with wireless development.

Speedware now delivers three key wireless offerings:

- Wireless Services - An experienced team of wireless Internet Developers
- Wireless Applications - A diverse portfolio of cutting edge wireless applications.
- MobileDev -The world's first and only professional WAP development tool

wireless experience and expertise

Speedware has been building our wireless development expertise since 1997 and our wireless consulting team has already created several groundbreaking mobile applications. Speedware wireless developers created a WAP version of the conference catalog for the Gartner Mobile e-Business 2000. Our team of wireless experts continues to push the limits of wireless development and has several more WAP innovations on deck.

Speedware's wireless solutions have already produced some groundbreaking work in the wireless community. At Gartner's Mobile e-Business 2000 Conference, Speedware participated in an innovative joint project with Hewlett-Packard, Siemens and Telefonica to provide attendees with a mobile conference application, as an alternative to the conventional conference catalog. We have also recently developed the world's first wireless grocery shopping and delivery system to complement their existing Web grocery shopping service for PeachTree Network. If you want to put your business on the wireless Internet, Speedware will get you there.

mobile success profile: DirecTours and the HP e3000

Using MobileDev, Speedware jumpstarted DirecTours into the wireless world with a convenient mobile travel application. DirecTours is a Travel Agency based in France offering its customers comprehensive travel packages at reasonable rates.

The application provides customers with practical wireless application that empowers them to reserve and book their flights as well as DirecTours' special travel packages all through the freedom of a mobile phone. This allows DirecTours to provide customers with a handy new means of accessing their travel services that helps set them apart from the competition.

This mobile travel application leverages the power of DirecTours' HP e3000 949 running Image and Omnidex. This allows DirecTours to take advantage of the latest technology trends while extending the value of their reliable HP investment.

At the time that this article was created, DirecTours was in a controlled testing phase and expect to go live in 2001.

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Subtotal: 617.08
Your order:
1▶Continue checkout
2 1 Yoplait Strawberr
3 1 Yoplait Peach Yog
4 1 Hunts Yamato Past
OK

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FLIGHT INFO
1 From [TOR 2000/06/0
2 To [VAN 2000/07/0
3 Passengers[Age1:33,
4▶Find flights
5 Reset
OK MENU

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Welcome Chris
1▶Current Balance
2 Pay Bills
3 Transfer Funds
4 Last 5 Cheques clea
5 Last 5 Deposits
OK Main Menu

```

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Conference Agenda
1▶Daily Schedule
2 What's On
3 Speakers
4 Search
5 Special Events
OK BACK

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Select a Category
1▶Hotel
2 Airline Company
3 Restaurant
4 Car (Gas station)
5 Car (Rental)
OK Cancel

```

mobile resume

Speedware already has created wireless applications that work with the HP e3000 for:

Grocery Shopping

Order your groceries online and have them delivered to your front door at your convenience.

Airline Arrangements

Make your airline reservations and check your travel arrangements on the go.

Mobile Banking

Do your banking while you travel across the globe.

Mobile Commerce

Shop for books, music or other goods while enjoying a stroll through the park.

Conference Programs

Review your conference program and schedule while taking a taxi to the convention center.

Corporate Expense Claims

Enter your dinner expense claim while you sip your coffee at the restaurant.

the first and only professional WAP development tool

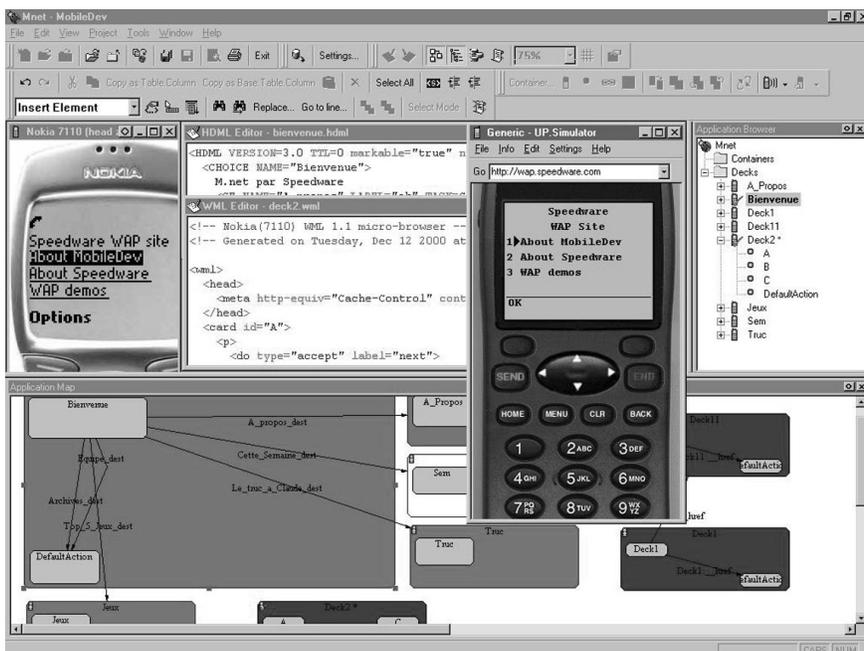
MobileDev is the first Wireless Development Environment specifically for WAP Internet applications. Its innovative open-ended development model integrates a graphical application mapper with a wizard-driven interface and a rich tool set to simplify WAP development. Versatile enough to satisfy the most demanding professional, MobileDev supports WAP technologies such as WML & HDML as well as enabling server technologies including, Perl, Java, J2ME, JSP, PHP and Microsoft ASP.

Using the GUI application mapper to show the relationships between objects, developers can quickly outline the components of a WAP application. Then they can take advantage of wizards that generate Decks and Cards in both WML and HDML, and use MobileDev's context sensitive code builder to write WML/HDML syntax that complements the wizard-generated code. The integration of the application mapper with wizards and the code builder provides a seamless integrated development environment that delivers results fast.

discover new opportunities

Speedware's total wireless solutions help you discover lucrative m-commerce and m-services opportunities as well as innovative B2B, B2C and B2E solutions that significantly enhance the way you do business with your HP e3000. Whether you are integrating existing technology investments or incorporating leading-edge mobile Internet innovations, Speedware delivers the right wireless mix that best suits your business needs.

www.mobiledev.speedware.com





The growth in capabilities of B2B and B2C Internet applications has pushed the development of dynamic, large scale, mission critical Web applications to its limits. And now, requirements for wireless support are pushing the envelope even further. Traditional CGI/Perl Web development platforms are being steadily replaced by emerging modern application servers. Characterized by server-side Java development for true object-oriented application design and large scale deployments, application servers are now embracing the world of wireless computing, supporting mobile handsets, PDAs and other things. A new generation of Web applications is going beyond the browser to become device independent to support the rapidly emerging world of mobile computing and commerce. From WML/WAP to J2ME to cHTML/iMode, new standards for delivering wireless Web applications are exploding.

Through the open-source process, the HP 3000 platform has been turned into an enterprise platform for delivering these new world mobile and browser-based Web applications. Lutris Enhydra, an open source Java/XML application server created and sponsored by Lutris Technologies, is turning the HP 3000 platform into a server of a new generation of XML powered devices.

Enhydra is a Java/XML open-source application server for wireless and Web application development and deployment. A development environment with a small set of carefully chosen tools, it's also a runtime environment for deploying and managing Enhydra applications. It is written entirely in Java, making it instantly available across all hardware and operating systems with a Java Virtual Machine.

Lutris Enhydra provides native support for both wired HTML browser devices and the popular WML (Wireless Markup Language) devices. Lutris Enhydra 3.5 extends wireless device support to include cHTML/I-mode, XHTML, J2ME, and VoiceXML.

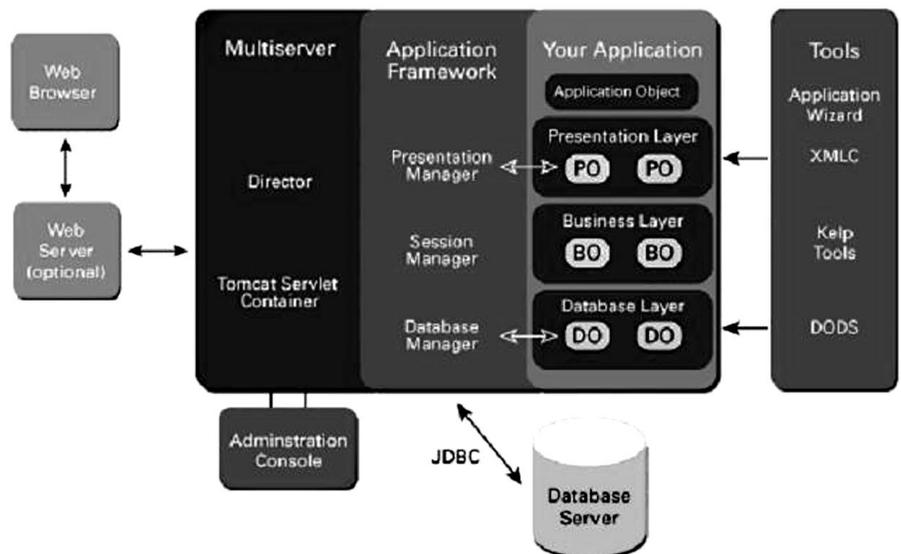
Thanks in large part to its worldwide availability via Enhydra.org, Enhydra is an excellent platform for building internationalized applications. Enhydra code has been refined for Unicode, Big 5, and Kanji. Multi-language support is made possible at the presentation layer by Enhydra XMLC, which makes it easy to load presentation skins that differ based on the preferred language.

Enhydra XMLC is the innovative technology that serves as Enhydra's XML engine. Enhydra XMLC leverages support for cascading style sheet ID attributes to associate areas of dynamic content with Java methods. Unlike JavaServer Pages, JSP, Enhydra XMLC avoids the introduction of new HTML/XML tags. By basing this technology in an XML foundation, Enhydra XMLC can support virtually any markup language required.

key components of the Enhydra Java/XML application server

- Enhydra Multiserver launches both Enhydra servlet applications and Tomcat Web container (servlet 2.2/JSP 1.1). The Multiserver also establishes and maintains connections to Web servers.
- Enhydra Director routes client requests to clusters of Enhydra servers for scalability and server-level failover.
- Enhydra Admin. Console remotely manages the lifecycle of Enhydra applications and manages debugging by monitoring HTTP requests/responses down to the servlet API.
- Enhydra Superservlet is a highly integrated servlet environment for rapid design and development of Enhydra applications.

Those who discover Enhydra's advantages will discover its focus on real world development and deployment. Enhydra XMLC was primarily developed to make Enhydra applications easy to support, maintain and evolve. Because Enhydra is open-source, developers have a greater degree of control than they could ever experience with closed source commercial products. For supporting mission-critical, server-based Web applications, Enhydra is the perfect solution.



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- Wireless Developer Network <http://www.wirelessdevnet.com/>
- Yospace <http://www.yospace.com/>