BEA WebLogic Server™

Programming WebLogic Server for Wireless Services

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Programming WebLogic Server for Wireless Services

Part Number	Date	Software Version
N/A	June 28, 2002	BEA WebLogic Server Version 7.0

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1. Introduction

2. Using WAP with WebLogic Server

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About This Document

This document explains how to use the BEA WebLogic Server™ platform to design and write Web applications that interface not only with the traditional desktop browser but also with the different types of wireless devices.

This document is organized as follows:

- Chapter 1, "Introduction," provides the basic information you need to know before using WebLogic Server to extend Web applications to wireless subscribers.
- Chapter 2, "Using WAP with WebLogic Server," discusses how to provide content suitable for the Wireless Application Protocol (WAP) application environment and how to configure and use WebLogic Server with a WAP Gateway.
- Chapter 3, "Using i-Mode with WebLogic Server," discusses how to provide content suitable for the i-Mode application environment and how to configure and use WebLogic Server with an i-Mode Gateway.
- Chapter 4, "Writing Web Applications to Include Wireless Subscribers," demonstrates through example how to use WebLogic Server to extend Web applications to wireless subscribers.

Audience

This document is written for application developers who are interested in building transactional Java applications that run in the WebLogic Server environment. It assumes a familiarity with WebLogic Server and Java™ 2, Enterprise Edition (J2EE) programming and wireless Web technologies.

e-docs Web Site

BEA product documentation is available on the BEA corporate Web site. From the BEA Home page, click on Product Documentation.

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A PDF version of this document is available on the WebLogic Server documentation Home page on the e-docs Web site (and also on the documentation CD). You can open the PDF in Adobe Acrobat Reader and print the entire document (or a portion of it) in book format. To access the PDFs, open the WebLogic Server documentation Home page, click Download Documentation, and select the document you want to print.

Adobe Acrobat Reader is available at no charge from the Adobe Web site at `http://www.adobe.com`.

Related Information

The BEA corporate Web site provides all documentation for WebLogic Server. Other WebLogic Server documents that you may find helpful when using WebLogic Server to write application services are:

- Introduction to BEA WebLogic Server at `http://e-docs.bea.com/wls/docs81b/intro/index.html`
- Administration Guide at `http://e-docs.bea.com/wls/docs81b/adminguide/index.html`
- Programming WebLogic XML at `http://e-docs.bea.com/wls/docs81b/xml/index.html`

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In your e-mail message, please indicate the software name and version you are using, as well as the title and document date of your documentation. If you have any questions about this version of BEA WebLogic Server, or if you have problems installing and running BEA WebLogic Server, contact BEA Customer Support through BEA WebSupport at http://www.bea.com. You can also contact Customer Support by using the contact information provided on the Customer Support Card, which is included in the product package.

When contacting Customer Support, be prepared to provide the following information:

- Your name, e-mail address, phone number, and fax number
- Your company name and company address
- Your machine type and authorization codes
- The name and version of the product you are using
- A description of the problem and the content of pertinent error messages

Documentation Conventions

The following documentation conventions are used throughout this document.

Convention	Usage
Ctrl+Tab	Keys you press simultaneously.
italics	Emphasis and book titles.

Convention	Usage

`monospace text`	Code samples, commands and their options, Java classes, data types, directories, and file names and their extensions. Monospace text also indicates text that you enter from the keyboard.
	Examples:
	`import java.util.Enumeration;`
	`chmod u+w *`
	`config/examples/applications`
	`.java`
	`config.xml`
	`float`

`monospace italic text`	Variables in code. *Example*: `String CustomerName;`
UPPERCASE TEXT	Device names, environment variables, and logical operators. *Examples*: LPT1 BEA_HOME OR
`{ }`	A set of choices in a syntax line.
`[ ]`	Optional items in a syntax line. *Example*: `java utils.MulticastTest -n name -a address [-p portnumber] [-t timeout] [-s send]`
`|`	Separates mutually exclusive choices in a syntax line. *Example*: `java weblogic.deploy [list|deploy|undeploy|update] password {application} {source}`
`...`	Indicates one of the following in a command line: ■ An argument can be repeated several times in the command line. ■ The statement omits additional optional arguments. ■ You can enter additional parameters, values, or other information

Convention	Usage
. . .	Indicates the omission of items from a code example or from a syntax line.

CHAPTER

1 Introduction

The following sections provide information that you need to know before using the BEA WebLogic Server™ platform to extend Web applications to wireless subscribers:

- Overview
- Wireless Data Protocols
- The WAP Protocol at a Glance
- The i-Mode Protocol at a Glance
- Other Wireless Data Protocols
- Other Wireless Markup Languages
- Evolution of Wireless Data Protocols and Wireless Markup Languages
- Additional Information

Overview

The wireless Internet-enabled subscriber base continues to grow. Telecommunications companies and wireless service providers are looking for ways to rapidly create and deploy new revenue-generating Internet services while providing their wireless subscribers with a more personalized experience.

Because wireless subscribers have a different set of essential desires and needs than desktop or even laptop Internet users, Internet services must be designed to present the optimum experience for subscribers using different types of wireless devices. Writing Internet services in this manner requires a deep understanding of the technical issues unique to the wireless environment.

Wireless Data Protocols

Using Internet technologies such as Hypertext Transfer Protocol (HTTP), Transport-Layer Security (TLS), Transmission Control Protocol (TCP), and Hypertext Markup Language (HTML) to set up and tear down connections and to transport Web content on a wireless network is inefficient for several reasons, including:

- HTTP and TCP are not optimized for the intermittent coverage, long latencies, and limited shared bandwidth associated with wireless networks.
- HTTP sends its headers and commands in a text format, which is not well suited for the low-bandwidth constraints of wireless networks, instead of the more efficient compressed binary format.
- HTTP session setup and teardown require many messages to be exchanged between the wireless device (client) and the server.
- HTML Web content intended for the desktop browser cannot be displayed in an effective way on the small-size screens of handheld mobile phones, personal digital assistants (PDAs), pagers, two-way radios, and smartphones.
- Navigation around and between screens is not easy due to no keyboard and no mouse; navigation is accomplished by pressing numeric keys or writing with a stylus.

Wireless services using these protocols are often slow, costly, and difficult to use, which is why special *wireless data protocols* were created to transport Web-based data on a wireless network. Wireless data protocols, such as Wireless Application Protocol (WAP), i-Mode, and others, are designed for the unique constraints of the wireless environment. They use binary transmission for greater compression of data and are optimized for long latency and low to medium bandwidth. They support protocol data

unit (PDU) concatenation and delayed acknowledgement to help reduce the number of messages sent. Their associated markup languages make optimum use of small screens and allow easy navigation around and between screens.

To read the markup language associated with a wireless data protocol, a wireless device requires a *microbrowser*, which is client software specially designed to interpret the markup language. As examples, a WAP-enabled device has a Wireless Markup Language (WML) microbrowser, and an i-Mode-enabled device has a *compact* HTML (cHTML) microbrowser.

The WAP Protocol at a Glance

The Wireless Application Protocol (WAP) specification consists of a wireless data protocol—a standardized way that the microbrowser on a wireless device communicates with a WAP gateway installed in the wireless network—and a markup language, Wireless Markup Language (WML). WML is an Extensible Markup Language (XML) used to specify the content and user interface for WAP-enabled devices.

WAP sessions cope with intermittent coverage and can operate over a wide variety of wireless bearer networks including but not limited to Cellular Digital Packet Data (CDPD), Code Division Multiple Access (CDMA), Global System for Mobiles (GSM), Time Division Multiple Access (TDMA), and General Packet Radio Service (GPRS). Although most WAP services in Europe and the United states are circuit-switched (dial-up), WAP will also work on packet-switched networks.

The i-Mode Protocol at a Glance

The i-Mode specification consists of a wireless data protocol—a standardized way that the microbrowser on a wireless device communicates with an i-Mode gateway installed in the wireless network—and a markup language, *compact* HTML (cHTML). cHTML is a subset of HTML with extensions and is used to specify the content and user interface for i-Mode-enabled devices.

Note: In publications, i-Mode appears in many different forms including *i-Mode*, *I-Mode*, *I-mode*, *i-mode*, and *imode*. *i-Mode* is used throughout this discussion and the discussions that follow.

While WAP is an open, global specification, i-Mode is currently a proprietary, closed specification developed and deployed by NTT DoCoMo of Japan. The only i-Mode implementation is NTT DoCoMo's mobile internet access system, although several telecommunication companies in Europe and the United States have expressed an interest in i-Mode.

Although i-Mode currently operates only on NTT-DoCoMo's PDC-P mobile voice system, i-Mode will work equally well on any underlying wireless bearer network.

Other Wireless Data Protocols

Other wireless data protocols include:

- Handheld Device Transport Protocol (HDTP) developed by Phone.com (formerly Unwired Planet and now Openwave Systems Inc.)
- OmniSky developed by the OmniSky Corporation
- Mobitex developed by the Mobitex Operators Association

The wireless industry is also very interested in the Voice over IP (VoIP) technology, which moves voice and data traffic over a common IP infrastructure. The wireless industry is looking for ways to converge the VoIP and wireless data protocol technologies so that voice and Web data can be carried on the same over-the-air channel.

Other Wireless Markup Languages

Other wireless markup languages include:

- Handheld Device Markup Language (HDML) developed by Phone.com (formerly Unwired Planet and now Openwave Systems Inc.)
- Web Clipping developed by Palm, Inc.
- Extensible HTML (XHTML) (Basic) developed by the World Wide Web Consortium (W3C)
- VoiceXML developed by the VoiceXML Forum, an industry organization founded by AT&T, IBM, Lucent, and Motorola

Note: HDTP carries Web content tagged with HDML. HDTP and HDML heavily influenced the development of WAP and WML.

Evolution of Wireless Data Protocols and Wireless Markup Languages

The various wireless data protocols and wireless markup languages in existence today may very well evolve into a single wireless data protocol and wireless markup language tomorrow. As evidence, proponents of the WAP protocol are about to migrate to a new generation of the protocol known as WAP-NG, and both AT&T an NTT DoCoMo have made allegiances to WAP-NG. In addition, proponents of WAP and i-Mode are talking about migrating to the common markup language XHTML (Basic).

Additional Information

Here are some Web sites (organized by category) to visit for additional information about wireless data protocols, wireless markup languages, manufacturers of wireless devices, and wireless standards and specifications.

Related WebLogic Wireless Information

BEA-written white paper titled "Beyond the Wire—Developing Software for Many Devices" at
`http://www.bea.com/products/weblogic/server/paper_pervasive.shtml`

BEA Wireless Newsgroup at
`news://newsgroups.bea.com/weblogic.developer.interest.wap`

BEA Wireless FAQ at
`http://e-docs.bea.com/wls/docs81b/faq/wireless.html`

General Wireless Information

The Wireless FAQ at `http://allnetdevices.com/faq`

FierceWireless at `http://www.fiercewireless.com`

MBizCentral at `http://www.mbizcentral.com`

Unstrung at `http://www.unstrung.com`

WirelessDevNet at `http://www.wirelessdevnet.com`

Wireless-Device Manufacturers

OmniSky at `http://www.omnisky.com`

Palm at `http://www.palm.com/wireless`

PocketPC at `http://www.microsoft.com/mobile/pocketpc/faq.asp`

RIM BlackBerry at `http://www.rim.net/products/handhelds/index.shtml`

Symbian Limited at `http://www.symbian.com`

Wireless Standards and Specifications

XHTML Basic W3C Recommendation at `http://www.w3.org/TR/xhtml-basic`

VoiceXML Forum Specifications at `http://www.voicexml.org/specs_1.html`

The Short Message Peer to Peer (SMPP) Forum at
`http://www.smpp.org/index.html`

SMS Protocol - UCP/EMI Specification at
`http://www.cmgtelecom.com/asp/index.asp?id=100`

SNPP pagers at `http://www.faqs.org/rfcs/rfc1861.html`

CHAPTER

2 Using WAP with WebLogic Server

The following sections describe how to provide content suitable for the Wireless Application Protocol (WAP) application environment and how to configure and use WebLogic Server with a WAP gateway:

Overview

Wireless Application Protocol (WAP) is an open, global specification, developed and deployed by the WAP Forum, that allows for the development of Internet and Web-based services for mobile phones and other wireless digital devices. Its founder members include the major wireless vendors of Ericsson, Motorola, Nokia, and Phone.com (formerly Unwired Planet and now Openwave Systems Inc).

The WAP specification addresses the limitations of wireless networks (low bandwidth, high latency, and unpredictable availability and stability) and wireless devices (limited CPU, memory, and battery life, and a simple user interface). It specifies two essential elements of wireless communication: an over-the-air wireless protocol and an application environment.

WAP gateways form the connection between clients on the wireless network and applications hosted on application servers on the Internet. The WAP gateway builds a bridge between the telecommunication and computer networks by routing requests from wireless clients to the application servers. It can be physically located in either network, though it is needed in only one of them.

WAP Application Environment

The WAP application environment defines the framework for network-neutral, wireless applications for narrowband devices. Two of the main components of the WAP application environment are Wireless Markup Language (WML) and WMLScript.

WML

WML for WAP applications is analogous to HTML for TCP/IP applications. It is an XML-based language that is specifically designed to interface with the microbrowsers that exist in WAP-enabled devices. The Wireless Markup Language Specification at `http://www.wapforum.org/what/technical.htm` defines the tags and structure of a WML document.

A WML document is a collection—referred to as a *deck*—of one or more *cards*. Each card in a deck of cards is considered a well defined unit of interaction. The general rule of thumb is that a card carries enough information to fit in one screen of a wireless device. For information on ways to serve WML documents to wireless clients, see "WAP Gateway" on page 2-3. For general information on WML, see "Additional Resources" on page 2-5.

WMLScript

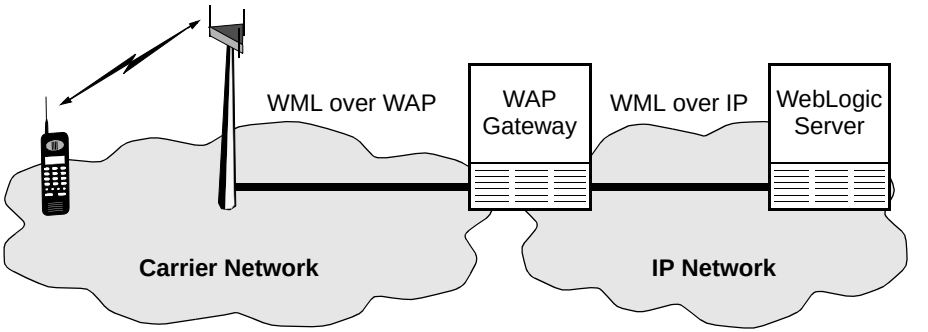
WMLScript provides general scripting capability to the WAP architecture. It is designed to overcome the limitations of narrowband communication and wireless clients. For example, WMLScript is a good way to validate form input without making a round trip to the server.

WMLScript resides in `.wmls` files that are made available to wireless clients by placing them into the document root. The document root is the root directory for files that are publicly available on WebLogic Server. For more detail, see the information on directory structures in Web Applications Basics at `http://e-docs.bea.com/wls/docs81b/webapp/basics.html`. For general information on WMLScript, see "Additional Resources" on page 2-5.

WAP Gateway

As shown in the following figure, the WAP gateway acts as the bridge between the wireless network containing wireless clients and the computer network containing application servers.

Figure 2-1 WAP Application Architecture



WAP Gateway Functionality

A WAP gateway typically includes the following functionality:

- Protocol gateway—the protocol gateway translates requests from the WAP protocol stack to the WWW protocol stack (HTTP and TCP/IP).
- Content encoders and decoders—the content encoders translate Web content into compact encoded formats to reduce the number and size of packets traveling over the wireless data network.

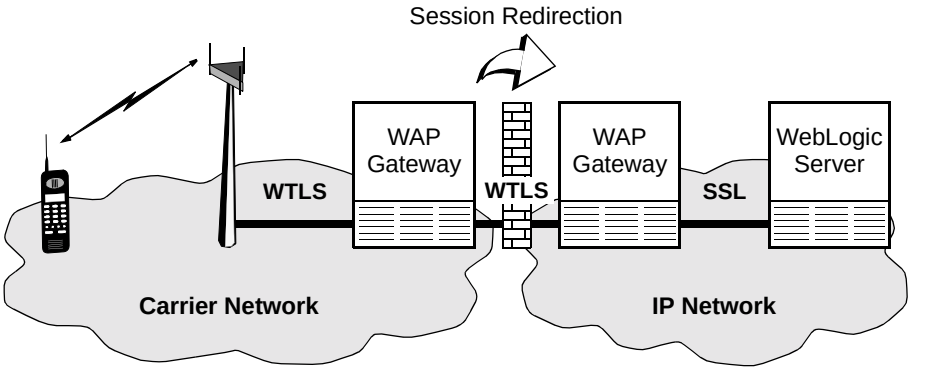
When a wireless client sends a request to a WAP application running on WebLogic Server, the request is first routed through the WAP gateway where it is decoded, translated to HTTP, then forwarded to the appropriate URL. The response is then re-routed back through the gateway, translated to WAP, encoded, and forward to the wireless client. This proxy architecture allows application developers to build services that are network and terminal independent.

WAP Gateway Security and Security Concerns

The security layer of the WAP protocol stack is called Wireless Transport Layer Security (WTLS). WTLS is based upon the established Transport-Layer Security (TLS) protocol standard.

For a secure connection employing the WAP protocol, a very small security risk exists at the WAP gateway during the switching of WTLS (WAP side) to SSL (IP side) and SSL to WTLS. Since the WAP protocol allows a session to be redirected from the carrier's gateway to the enterprise's gateway, an enterprise may want to control this minimal risk by including a WAP gateway behind its firewall. As shown in the following figure, the enterprise secures the server running the WAP gateway in a controlled environment to eliminate any exposure to the security risk.

Figure 2-2 WAP Session Redirection



Since the carrier is a trusted entity and is continuously responsible for protecting voice, fax, computer and other types of data, enterprises probably do not need to host their own WAP gateway.

WAP Gateway Vendors

There are a growing number of vendors that provide WAP gateways. WebLogic Server should work with any WAP-compliant gateway. For a list of WAP-compliant gateways and other WAP products, refer to the WAP Deployment Fact Sheet at `http://www.wapforum.org/new/index.htm` compiled by the WAP Forum.

Additional Resources

Here are some Web sites (organized by category) to visit for additional information about WebLogic Server programming, WAP, and WML.

Related WebLogic Technologies

Programming WebLogic JSP at
`http://e-docs.bea.com/wls/docs81b/jsp/index.html`

Programming WebLogic HTTP Servlets at
`http://e-docs.bea.com/wls/docs81b/servlet/index.html`

Programming WebLogic XML at
`http://e-docs.bea.com/wls/docs81b/xml/index.html`

Web Applications Basics at
`http://e-docs.bea.com/wls/docs81b/webapp/basics.html`

General WAP Information

WAP Forum at `http://www.wapforum.org`

Ericsson: Developers' Zone at `http://www.ericsson.com/developerszone`

Motorola at `http://developers.motorola.com/developers/wireless`

Nokia: WAP Solutions for Mobile Business at
`http://www.nokia.com/corporate/wap/index.html`

Openwave Developer Resources at
`http://developer.openwave.com/resources/index.html`

WAP Specifications and White Papers

WAP specifications at `http://www.wapforum.org/what/technical.htm`

WAP white papers at `http://www.wapforum.org/what/whitepapers.htm`

WAP Toolkits

Nokia WAP Toolkit at `http://www.nokia.com/corporate/wap/sdk.html`

Motorola Tools and Downloads at
`http://developers.motorola.com/developers/wireless/tools`

Openwave Software Development Kit at
`http://developer.openwave.com/download/index.html`

Ericsson Developers' Zone at `http://www.ericsson.com/developerszone`

3 Using i-Mode with WebLogic Server

The following sections describe how to provide content suitable for the i-Mode application environment and how to configure and use WebLogic Server with an i-Mode gateway:

Overview

i-Mode is currently a proprietary, closed specification, developed and deployed by NTT DoCoMo of Japan, that allows for the development of Internet and Web-based services for mobile phones and other wireless digital devices. The only i-Mode implementation is DoCoMo's mobile internet access system, although several telecommunication companies in Europe and the United States have expressed an interest in i-Mode.

Note: i-Mode is a trademark and/or service mark owned by NTT DoCoMo.

The i-Mode specification addresses the limitations of wireless networks (low bandwidth, high latency, and unpredictable availability and stability) and wireless devices (limited CPU, memory, and battery life, and a simple user interface). It specifies two essential elements of wireless communication: an over-the-air wireless protocol and a markup language.

i-Mode gateways form the connection between clients on the wireless network and applications hosted on application servers on the Internet. The i-Mode gateway builds a bridge between the telecommunication and computer networks by routing requests from wireless clients to the application servers.

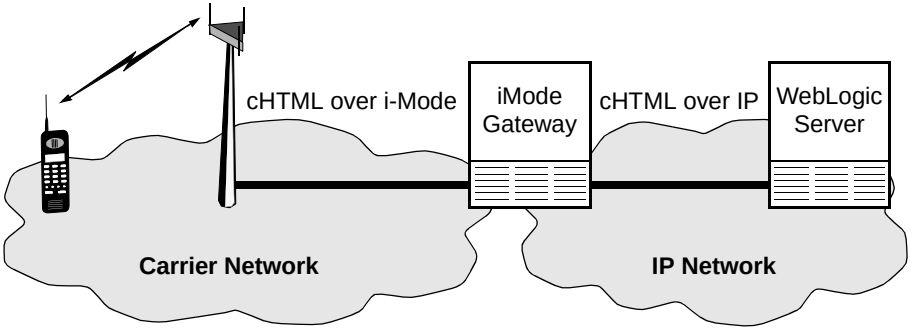
i-Mode Markup Language

i-Mode applications use the *compact* Hypertext Markup Language (cHTML), which is specifically designed to interface with the microbrowsers in i-Mode-enabled devices. cHTML is a subset of HTML, with a number of extensions for the mobile phone environment. The NTT DoCoMo (English) Supported Tags and Specs at http://www.nttdocomo.co.jp/english/p_s/imode/ defines the tags and structure of a cHTML document.

i-Mode Gateway

As shown in the following figure, the i-Mode gateway acts as the bridge between the wireless network containing wireless clients and the computer network containing application servers.

Figure 3-1 i-Mode Application Architecture



An i-Mode gateway typically includes a protocol gateway, which translates requests from the i-Mode protocol stack to the WWW protocol stack (HTTP and TCP/IP).

When a wireless client sends a request to an i-Mode application running on WebLogic Server, the request is first routed through the i-Mode gateway and then forwarded to the appropriate URL. The response is then re-routed back through the gateway, translated to i-Mode, and forward to the wireless client. This proxy architecture allows application developers to build services that are network and terminal independent.

Additional Resources

Here are some Web sites (organized by category) to visit for additional information about WebLogic Server programming, i-Mode, and cHTML.

Related WebLogic Technologies

Programming WebLogic JSP at
`http://e-docs.bea.com/wls/docs81b/jsp/index.html`

Programming WebLogic HTTP Servlets at
`http://e-docs.bea.com/wls/docs81b/servlet/index.html`

Programming WebLogic XML at
`http://e-docs.bea.com/wls/docs81b/xml/index.html`

Web Applications Basics at
`http://e-docs.bea.com/wls/docs81b/webapp/basics.html`