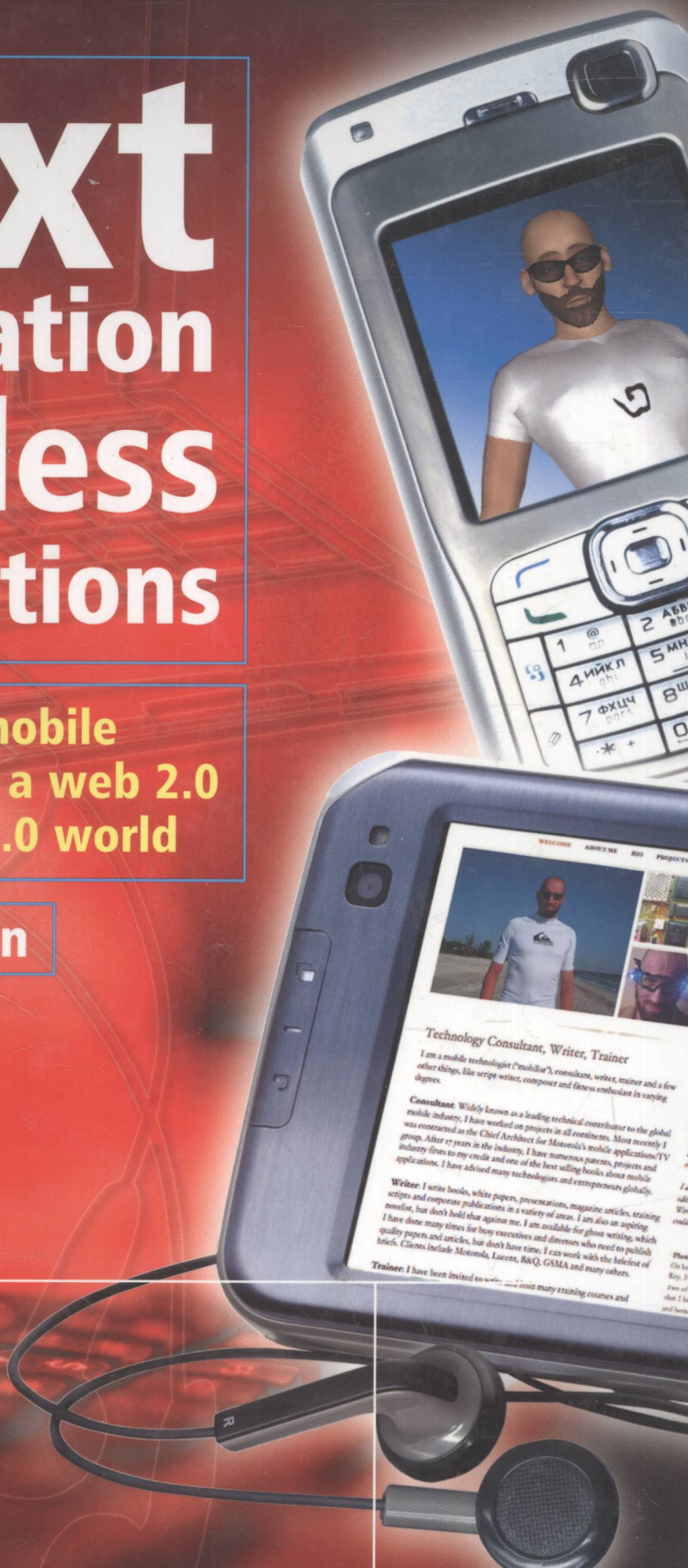
Paul Golding

# next generation wireless applications

## creating mobile applications in a web 2.0 and mobile 2.0 world

second edition

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# Next Generation Wireless Applications

## Creating Mobile Applications in a Web 2.0 and Mobile 2.0 World

**Second Edition**

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John Wiley & Sons, Ltd

Published by John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester,
West Sussex PO19 8SQ, England

Telephone (+44) 1243 779777

Email (for orders and customer service enquiries): cs-books@wiley.co.uk
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John Wiley & Sons (Asia) Pte Ltd, 2 Clementi Loop #02-01, Jin Xing Distripark, Singapore 129809

John Wiley & Sons Canada Ltd, 6045 Freemont Blvd, Mississauga, Ontario L5R 4J3, Canada

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***Library of Congress Cataloging-in-Publication Data***

Golding, Paul, 1968–
Next generation wireless applications : creating mobile applications in a Web 2.0 and Mobile 2.0 world / Paul Golding. – 2nd ed.
p. cm.
Includes index.
ISBN 978-0-470-72506-1 (cloth : alk. paper)
1. Wireless communication systems. 2. Mobile communication systems. I. Title.
TK5103.2.G63 2008
621.384–dc22 2007045746

***British Library Cataloguing in Publication Data***

A catalogue record for this book is available from the British Library

ISBN 978-0-470-72506-1 (HB)

Typeset in 10/12pt Times by Aptara Inc., New Delhi, India
Printed and bound in Great Britain by Antony Rowe Ltd, Chippenham, England.
This book is printed on acid-free paper.

# Next Generation Wireless Applications

To my wife and kids

# *Acknowledgements*

I would like to thank all those who have supported and assisted me in writing the second edition of this book, especially my wife and kids for their usual encouragement. Thanks to all those companies who have assisted me with images.

# *Preface*

This book is intended to give wireless practitioners a means by which to navigate and think about the increasingly complex world of next generation mobile application technologies. It is an attempt to describe and contextualise a number of prevalent and emerging paradigms for providing services on mobile devices other than the familiar calling and texting. The availability of new wireless technologies increasingly coincides with many other exciting technologies that are now within the mobile solutions toolkit, such as accurate location finding, rich client solutions, smarter devices, efficient protocols and many other micro and macro components. Possibly the most enticing aspect of these technologies is their ability to integrate into the massively connected world of the Internet, allowing new levels of service integration not envisaged at the start of the mobile data era. This is thanks to the vast array of Internet software tools, methods and services that continue to develop rapidly, even after the dot.com collapse, including the so-called Web 2.0 platform.

The rapid rise of so many *anytime, anyplace* possibilities is proving to be a challenge in terms of how to understand the many ideas that can be utilised when providing new and exciting services. Perhaps a programmer working on an application for a Java-capable handset is unable to grasp how best to incorporate location-finding techniques, or how to think about the security implications of their design, or how to utilise SIP or other protocols. This 'think about' step is the aspect that I am mostly trying to aid with this book, introducing and connecting some of the major technologies and themes applicable to mobile applications.

Combining these technologies can lead us to a bristling array of possibilities. Revealing such potentials is the real purpose of this book, which is why the contents are not organised into a more conventional menu of subjects, but largely grouped into themes that seem to follow a useful mental model when thinking about mobile applications; hence, why I feel justified in talking about J2EE and CDMA in the same book. They are vastly different technologies, but also very much connected within the world of mobile applications.

I hope that you succeed with your wireless endeavours and that this book provides you with enough interesting material to 'think mobile' in your own way. Please email me your feedback, experiences, questions, or ideas to ngwa@paulgolding.com.

*Regards*
*Paul Golding, 2007*
www.paulgolding.com

# *Abbreviations and Acronyms*

| | |
|---|---|
| 2G | Second Generation |
| 3G | Third Generation |
| 3GPP | Third Generation Partnership Project |
| AD | Analog–Digital |
| ADPCM | Adaptive Differential Pulse-Coded Modulation |
| A-GPS | Assisted GPS |
| AJAX | Asynchronous JavaScript and XML |
| AKS | Authentication Algorithm |
| AI | Application Interface |
| ALU | Arithmetic Logic Unit |
| AMR | Adaptive Multirate |
| AMS | Application Management System |
| API | Application Programming Interface |
| ARPU | Average Revenue Per User |
| AS | Application Server |
| ASCII | American Standard Code for Information Interchange |
| B2BUA | Back-to-Back User Agent |
| BCF | Border Control Function |
| BEEP | Blocks Extensible Exchange Protocol |
| BER | Bit Error Rate |
| BGCF | Border Gateway Control Function |
| BSC | Base Station Controller |
| BSS | Base Station Subsystem |
| BT | Bluetooth |
| BTS | Base Transceiver Station |
| CA | Certificate Authority |
| CAB | Cabinet |
| CAS | Conditional Access System |
| CB | Citizens' Band |

| | |
|---|---|
| CC/PP | Composite Capability/Preference Profile |
| CD | Client Domain |
| CDC | Connected Device Configuration |
| CDMA | Code Division Multiple Access |
| CEF | Common Executable Format |
| cHTML | compact HTML |
| CLDC | Connected Limited Device Configuration |
| CLR | Common Language Runtime |
| CMS | Content Management System |
| Codec | Coder–Decoder |
| COM | Communication Port |
| COPS | Common Open Policy Service |
| CORBA | Common Object Request Broker Architecture |
| CPC | Cost-Per-Click |
| CPI | Capability and Preference Information |
| CPIM | Common Presence and Instant Messaging |
| CPM | Cost-Per-Impression |
| CPU | Central Processing Unit |
| CRM | Customer Relationship Management |
| CS | Client–Server; Circuit-Switched |
| CSCF | Call Session Control Function |
| CSS | Cascading Style Sheets |
| DBMS | Database Management System |
| D2C | Direct-to-Consumer |
| DCT | Discrete Cosine Transform |
| DD | Download Descriptor |
| DDP | Packet Data Protocol |
| D-GPS | Differential GPS |
| DHCP | Dynamic Host Control Protocol |
| DIA | Device Independence Activity |
| DMA | Direct Memory Access |
| DNS | Domain Name System |
| DOM | Document Object Model |
| DoS | Denial of Service |
| DRM | Digital Rights Management |
| DSP | Digital Signal Processing; Digital Signal Processor |
| DTD | Document Type Definition |
| DVB-H | Digital Video Broadcasting Handheld |
| E911 | Enhanced 911 |
| ECC | Error Correction Correcting |
| EFI | External Functionality Interface |
| EFIAS | External Functionality Intraface Application Interface |
| EIS | Enterprise Information Services |
| EJB | Enterprise Java Bean |
| E-OTD | Enhanced OTD |
| ETSI | European Telecommunications Standards Institute |
| FCC | Federal Communications Commission |

| | |
|---|---|
| FDMA | Frequency Division Multiple Access |
| FMC | Fixed-Mobile Convergence |
| FML | Film XML |
| FOAF | Friend-Of-A-Friend |
| FTP | File Transfer Protocol |
| GA | General Access |
| GGSN | Gateway GPRS Service Node |
| GIF | Graphic Interchange Format |
| GIS | Global Information System |
| GMLC | Gateway Mobile Location Centre |
| GPRS | General Packet Radio Service |
| GPS | Global Positioning System |
| GSM | Global System for Mobile Communications |
| GUI | Graphical User Interface |
| H2C | Human-to-Content |
| H2H | Human-to-Human |
| H2M | Human-to-Machine |
| HDML | Handheld Device Markup Language |
| HLR | Home Location Register |
| HSDPA | High-Speed Downlink Packet Access |
| HSPA | High-Speed Packet Access |
| HSS | Home Subscriber Server |
| HSUPA | High-Speed Uplink Packet Access |
| HTML | HyperText Markup Language |
| HTTP | HyperText Transfer Protocol |
| HTTPS | HTTP Secured |
| ICMP | Internet Control Message Protocol |
| I-CSCF | Interrogating CSCF |
| ID | Identification |
| IDE | Integrated Development Environment |
| IDL | Interaction Data Language |
| IETF | Internet Engineering Task Force |
| IF | Intermediate Frequency |
| IIOP | Internet Inter-ORB Protocol |
| IM | Instant Messaging |
| IMAP4 | Internet Mail Application Protocol 4 |
| IMC | Inter-MIDlet Communications |
| IMM | Integrated Mobile Marketplace |
| IMP | Instant Messaging and Presence Protocol |
| IMS | IP Multimedia System |
| IMSI | International Mobile Subscriber Identity |
| IN | Intelligent Networking |
| IP | Internet Protocol |
| IPTV | Internet Protocol Television |
| ISDN | Integrated Services Digital Network |
| ISP | Internet Service Provider |
| ISUP | ISDN User Port |

| | |
|---|---|
| IVR | Interactive Voice Response |
| J2EE | Java 2 Enterprise Edition |
| J2ME | Java 2 Micro Edition |
| J2SE | Java 2 Standard Edition |
| JAAS | Java Authentication and Authorisation Service |
| JAD | Java Application Descriptor |
| JAR | Java Archive |
| JAXP | Java API for XML Processing |
| JDBC | Java Database Connector |
| JDE | Java Developer Environment |
| JEP | Jabber Enhancement Proposals |
| JIT | Just In Time |
| JMS | Java Messaging Service |
| JNDI | Java Naming and Directory Interface |
| JNI | Java Native Interface |
| JPEG | Joint Picture Experts Group |
| JRE | Java Runtime Evironment |
| JSF | Jabber Software Foundation |
| JSP | Java Server Page |
| JVM | Java Virtual Machine |
| JXTA | Juxtapose |
| KVM | Kilo Virtual Machine |
| LAN | Local Area Network |
| LBS | Location-Based Service |
| LCD | Liquid Crystal Display |
| LDAP | Lightweight Directory Access Protocol |
| LIF | Location Interoperability Forum |
| LMU | Location Measurement Unit |
| LOS | Line-of-Sight |
| LTN | Long Thin Networks |
| M2M | Machine-to-Machine |
| MBMS | Multimedia Broadcast Multicast Service |
| MDB | Message-Driven Bean |
| MD5 | Message Digest (algorithm) 5 |
| MGCF | Media Gateway Control Function |
| MGW | Media Gateway |
| MID | Mobile Information Device |
| MIDI | Musical Instrument Digital Interface |
| MIDP | Mobile Information Device Profile |
| MIME | Multipurpose Internet Mail Extension |
| MIPS | Millions of Instruction Per Second |
| MLG | Mobile Location Gateway |
| MLP | Mobile Location Protocol |
| MM | Multimedia Message |
| MMC | Multimedia Message Centre |
| MMI | Man–Machine Interface |
| MMS | Multimedia Messaging Service |

| | |
|---|---|
| MMSC | Multimedia Messaging Service Centre |
| MMX | Multimedia Extensions |
| MO | Mobile Originated |
| MOM | Message-Orientated Middleware |
| MNO | Mobile Network Operator |
| MP3 | MPEG-1 Layer 3 |
| MRSP | Messaging Relay Session Protocol |
| MS | Mobile Station |
| MSC | Mobile Switching Centre |
| MSISDN | Mobile Station Integrated Services Digital Network |
| MVC | Model View Controller |
| MVNO | Mobile Virtual Network Operator |
| NACK | Negative ACK |
| NAT | Network Address Translation |
| NGN | Next Generation Network |
| NTP | Network Time Protocol |
| O&M | Operations and Maintenance |
| OBEX | Object Exchange |
| ODBC | Open Database Connector |
| ODP | On-Device Portal |
| OFDM | Orthogonal Frequency Division Multiplexing |
| OMA | Open Mobile Alliance |
| OMC | Operations & Maintenance Centre |
| OOP | Object-Orientated Programming |
| ORB | Object Request Broker |
| OS | Operating System |
| OSA | Open Services Architecture |
| OSA-SCS | Open Service Access – Service Capability Server |
| OSI | Open System Interconnection |
| OTA | Over-The-Air |
| OTD | Observed Time Difference |
| P2P | Person-to-Person, Peer-to-Peer |
| PABX | Private Automatic Branch Exchange |
| PAM | Pluggable Authentication Module; Presence and Availability Management |
| PAN | Personal Area Network |
| PAP | Push Access Protocol |
| PCMCIA | Personal Computer Memory Card International Association |
| P-CSCF | Proxy CSCF |
| PCU | Packet Controller Unit |
| PD | Personal Domain |
| PDA | Personal Digital Assistant |
| PDF | Policy Decision Function |
| PDP | Packet Data Protocol |
| PDU | Packet Data Unit |
| PILC | Performance Implications of Link Characteristics |
| PIM | Personal Information Management |
| PKC | Public Key Cryptography |

| | |
|---|---|
| PKI | Public Key Infrastructure |
| PM | Program Management |
| PMG | Personal Mobile Gateway |
| PMP | Personal Media Player |
| PNG | Portable Network Graphics |
| PoC | Push-to-Talk over Cellular |
| POI | Points of Interest |
| POIX | Point of Interest Exchange Language |
| POP3 | Post Office Protocol 3 |
| POTS | Plain Old Telephone System |
| PPG | Push Proxy Gateway |
| PPP | Point-to-Point Protocol |
| PSAP | Public Safety Answering Point |
| PSMS | Premium-Rate Text-Messaging Service |
| PMPs | Personal Media Players |
| PS | Packet-Switch |
| PSTN | Public Switched Telephony Network |
| PT | Predictive Text |
| PTT | Push-to-Talk |
| PVR | Personal Video Recorder |
| QoS | Quality of Service |
| RADIUS | Remote Authentication Dial In User Service |
| RDF | Resource Description Framework |
| RF | Radio Frequency |
| RFC | Request For Comments |
| RIM | Research in Motion |
| RMI | Remote Method Invocation |
| RMI-IIOP | RMI Internet Inter-ORB Protocol |
| RNC | Radio Network Controller |
| ROM | Read-Only Memory |
| RPC | Remote Procedure Call |
| RSS | RDF Site Syndication |
| RTOS | Real-Time Operating System |
| RTP | Real-time Transport Protocol; Real-Time Protocol |
| RTSP | Real Time Streaming Protocol |
| RTTTL | Ringing Tones Text Transfer Language |
| SACK | Selective ACK |
| SAR | Segmentation and Reassembly |
| S-CSCF | Serving CSCF |
| SD | Social Domain |
| SDK | Software Developer's Kit |
| SDMA | Spatial Division Multiple Access |
| SDP | Service Delivery Platform; Session Description Protocol |
| SF | Service Functions |
| SGN | Signalling Gateway |
| SGSN | Serving GPRS Service Nodes |
| SI | Service Indication |

| | |
|---|---|
| SIM | Subscriber Identity Module |
| SIMD | Single Instruction Multiple Data |
| SIMPLE | SIP for Instant Messaging and Presence Leveraging Extensions |
| SIP | Session Initiation Protocol |
| SISD | Single Instruction Single Data |
| SLEE | Service Logic Execution Environment |
| SM | Spatial Messaging |
| SMIL | Synchronized Multimedia Integration Language |
| SMLC | Serving Mobile Location Centre |
| SMPP | Short Message Point-to-Point |
| SMS | Short Message Service |
| SMSC | Short Message Service Centre |
| SMTP | Simple Mail Transfer Protocol |
| SOA | Service-Orientated Architecture |
| SOAP | Simple Object Access Protocol |
| SP-MIDI | Scalable Polyphony MIDI |
| SQL | Structured Query Language |
| SRAM | Static Random Access Memory |
| SSE | Streaming SIMD Extensions |
| SSL | Secure Socket Layer |
| STB | Set-Top Box |
| SVG | Scalable Vector Graphics |
| Sync ML | Synchronization Markup Language |
| TCP | Transmission Control Protocol |
| TCP/IP | Transmission Control Protocol over Internet Protocol |
| TDD | Time-Division Duplexing |
| TDMA | Time Division Multiple Access |
| THIG | Topology Hiding Internetwork Gateway |
| TID | Transaction ID |
| TISPAN | Telecoms & Internet Converged Services & Protocols for Advanced Networks |
| TLD | Top-Level Domain |
| TLS | Transport Layer Security |
| TSTV | Time-Shifted TV |
| UAProf | User Agent Profile |
| UDP | User Datagram Protocol |
| UE | User Element |
| UGC | User-Generated Content |
| UI | User Interface |
| UMA | Universal Mobile Access |
| UML | Unified Modelling Language |
| UMTS | Universal Mobile Telecommunication System |
| URI | Uniform Resource Identifier |
| URL | Uniform Resource Locator |
| USB | Universal Serial Bus |
| UTF | Unicode Text Format |
| UTM | Universal Transverse Mercator |

| | |
|---|---|
| UTRAN | Universal Terrestrial Radio Access Network |
| VB | Visual Basic |
| VC | Visual C++ |
| VGA | Videographics Array |
| VLR | Visitor Location Register |
| VOD | Video On Demand |
| VoIP | Voice over IP |
| VPN | Virtual Private Network |
| VR | Virtual Reality |
| W3C | World Wide Web Consortium |
| WAN | Wide Area Network |
| WAP | Wireless Application Protocol |
| WBMP | Wireless BitMap |
| WBXML | WAP Binary XML |
| WCDMA | Wideband CDMA |
| WCSS | WAP CSS |
| WDP | Wireless Datagram Protocol |
| WG | Working Group |
| W-HTTP | Wireless-profiled HTTP |
| WI | Work Item |
| WJMS | Wireless Java Messaging Service |
| WLS | WebLogic Server |
| WML | WAP Markup Language; Wireless Markup Language |
| WSDL | Web Services Description Language |
| WSP | Wireless Session Protocol |
| WTAI | Wireless Telephony Applications Interface |
| W-TCP | Wireless-profiled TCP |
| WTLS | Wireless TLS |
| WTP | Wireless Transport Protocol |
| WURFL | Wireless Universal Resource File |
| WYSIWYG | What You See Is What You Get |
| XHTML | eXtensible Hypertext Markup Language |
| XHTML-MP | XHTNL-Mobile Profile |
| XML | eXtensible Markup Language |
| XMPP | eXtensible Messaging and Presence Protocol |
| XSL | XML Stylesheet Language |
| XUL | eXtensible User Interface Language |

# *Contents*