

# BLUETOOTH REVEALED

THE INSIDER'S GUIDE TO AN OPEN SPECIFICATION  
FOR GLOBAL WIRELESS COMMUNICATIONS

BRENT A. MILLER • CHATSIK BISDIKIAN



Library of Congress Cataloging-Publication Data

Miller, Brent A.

Bluetooth revealed / Brent A. Miller, Chatschik Bisdikian.

p. cm.

Includes bibliographical references and index.

ISBN 0-13-090294-2

1. Bluetooth technology. 2. Telecommunication—Equipment and supplies.  
3. Computer Network protocols. I. Bisdikian, Chatschik. II. Title.

TK5103.3 .M55 2000

004.6'20--dc21

Editorial/production supervision: *Kathleen M. Caren*

Acquisition Editor: *Mary Franz*

Editorial Assistant: *Noreen Regina*

Marketing Manager: *Bryan Gambrel*

Manufacturing Manager: *Maura Zaldivar*

Cover Design: *Nina Scuderi*

Cover Illustration: *Tom Post*

Cover Design Director: *Jerry Votta*

Series Design: *Gail Cocker-Bogusz*



© 2001 Prentice Hall PTR

Prentice-Hall, Inc.

Upper Saddle River, NJ 07458

All rights reserved. No part of this book may be reproduced, in any form or by any means, without permission in writing from the publisher

The publisher offers discounts on this book when ordered in bulk quantities.

For more information, contact

Corporate Sales Department, Prentice Hall PTR

One Lake Street

Upper Saddle River, NJ 07458

Phone: 800-382-3419; FAX: 201-236-7141

Email (Internet): [corpsales@prenhall.com](mailto:corpsales@prenhall.com)

All products or services mentioned in this book are the trademarks or service marks of their respective companies or organizations.

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

ISBN 0-13-090294-2

Prentice-Hall International (UK) Limited, *London*

Prentice-Hall of Australia Pty. Limited, *Sydney*

Prentice-Hall Canada Inc., *Toronto*

Prentice-Hall Hispanoamericana, S.A., *Mexico*

Prentice-Hall of India Private Limited, *New Delhi*

Prentice-Hall of Japan, Inc., *Tokyo*

Pearson Education Asia Pte. Ltd.

Editora Prentice-Hall do Brasil, Ltda., *Rio de Janeiro*

# Contents

Foreword	<i>xi</i>
Preface	<i>xiii</i>
<b>Acknowledgements</b>	<i>xv</i>
<b>Trademark List</b>	<i>xvi</i>

---

## Part 1

### **INTRODUCTION TO BLUETOOTH WIRELESS COMMUNICATION 1**

#### Chapter 1

What Is Bluetooth? 3

**The Bluetooth Special Interest Group 5**

**The Bluetooth Name and History 9**

**Reader's Guide to This Book 10**

#### Chapter 2

Technology Basics 15

**Wired and Wireless Communications 15**

**Radio Frequency Wireless Communications 16**

**Infrared Wireless Communication 19**  
**The Bluetooth RF Communications Solution 20**

Chapter 3  
Bluetooth Usage Models 29

**The Cordless Computer 30**  
**The Ultimate Headset 32**  
**The Three-in-One Phone 34**  
**The Interactive Conference (File Transfer) 35**  
**The Internet Bridge 37**  
**The Speaking Laptop 40**  
**The Automatic Synchronizer 41**  
**The Instant Postcard 43**  
**Ad Hoc Networking 44**  
**Hidden Computing 44**

Chapter 4  
Introduction to the Bluetooth Specification 47

**Purpose of the Specification 48**  
**Scope 49**  
**The Specification's Structure 50**  
**Relationships 52**  
**Guide to Understanding the Specification 53**

---

Part 2

**THE BLUETOOTH SPECIFICATION EXAMINED 57**

Chapter 5  
The Bluetooth Protocol Stack 59

**The Protocol Stack Components 59**  
**The Transport Protocol Group 61**

**The Middleware Protocol Group 66**  
**The Application Group 72**

Chapter 6

**The Lower Protocols of the Transport Group 77**

**The Bluetooth Radio 79**

**The Link Controller and Baseband 83**

**The Link Manager and Link Manager Protocol 108**

**Summary 121**

Chapter 7

**The Upper Protocols of the Transport Group 123**

**The L2CAP Layer 125**

**The Host Controller Interface (HCI) 140**

**Summary 153**

Chapter 8

**The RFCOMM and SDP Middleware Protocols 155**

**The RFCOMM Protocol 156**

**The Service Discovery Protocol (SDP) 164**

Chapter 9

**IrDA Interoperability Middleware Protocols 177**

**IrDA and Bluetooth Wireless Communication Compared 179**

**The IrDA Interoperability Protocols 182**

Chapter 10

**Audio and Telephony Control 189**

**Audio and Telephony Control Operation 190**

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.