

HANDBOOK OF ANTENNAS IN WIRELESS COMMUNICATIONS

Edited by
LAL CHAND GODARA



CRC Press

Boca Raton London New York Washington, D.C.

Contents

PART A Wireless Communication Systems and Channel Characteristics

- 1 **Cellular Systems** *Lal C. Godara*
- 2 **Satellite-Based Mobile Communications** *Michael J. Ryan*
- 3 **Propagation Prediction for Urban Systems** *Henry L. Bertoni and Saúl A. Torrico*
- 4 **Fading Channels** *Bernard Sklar*

PART B Antenna Technology and Numerical Methods

- 5 **Antenna Parameters, Various Generic Antennas and Feed Systems, and Available Softwares** *Jennifer Bernhard and Eric Michielssen*
- 6 **Microstrip Patch Antennas** *Rod Waterhouse*
- 7 **The Finite Difference Time Domain Technique for Microstrip Antenna Applications** *Atef Z. Elsherbeni, Christos G. Christodoulou, and Javier Gómez-Tagle*
- 8 **Method of Moments Applied to Antennas** *Tapan K. Sarkar, Antonije R. Djordjevic, and Branko M. Kolundzija*
- 9 **Genetic Algorithms** *Wesley O. Williamson and Sembiam R. Rengarajan*
- 10 **High-Frequency Techniques** *Roberto G. Rojas and Teh-Hong Lee*

PART C Antenna Developments and Practical Antennas

- 11 **Outdoor and Indoor Cellular/Personal Handy Phone System Base Station Antenna in Japan** *Hiroyuki Arai*
- 12 **Handheld Antennas** *Atef Z. Elsherbeni, Chun-Wen Paul Huang, and Charles E. Smith*
- 13 **Aeronautical and Maritime Antennas for Satellite Communications** *Shingo Ohmori*
- 14 **Fixed and Mobile Antennas for Satellite Communications** *Marek Bialkowski, Nemai C. Karmakar, Paul W. Davis, and Hyok J. Song*
- 15 **Shaped-Beam Antennas** *Carlos A. Fernandes*

PART D Smart Antennas and Array Theory

- 16 **Basic Array Theory and Pattern Synthesis Techniques** *Boon Poh Ng and Meng Hwa Er*
- 17 **Electromagnetic Vector Sensors with Beamforming Applications** *Arye Nehorai, Kwok-Chiang Ho, and B. T. G. Tan*
- 18 **Optimum and Suboptimum Transmit Beamforming** *Mats Bengtsson and Björn Ottersten*
- 19 **Spatial Diversity for Wireless Communications** *Ramakrishna Janaswamy*
- 20 **Direction-of-Arrival Estimation in Mobile Communication Environments** *Mats Viberg and Thomas Svantesson*
- 21 **Blind Channel Identification and Source Separation in Space Division Multiple Access Systems** *Victor Barroso, João Xavier, and José M. F. Moura*

PART E Implementation of Smart Antenna Systems

- 22 Smart Antenna System Architecture and Hardware Implementation**
T. Bao Vu
- 23 Phased-Array Technology for Wireless Systems** *Hiroyo Ogawa,
Hiroyuki Tsuji, Ami Kanazawa, Ryu Miura, and Masato Tanaka*
- 24 Adaptive Antennas for Global System for Mobile Communications and
Time Division Multiple Access (Interim Standard-136) Systems**
*Sören Andersson, Bo Hagerman, M. Berg, H. Dam, Ulf Forssén, J.
Karlsson, F. Kronestedt, S. Mazur, and K. J. Molnar*

PART F Electromagnetic Radiation and the Human Body

- 25 Electromagnetic Interactions of Handheld Wireless Communication
Antennas with the Human Body** *Magdy F. Iskander and
Zhengqing Yun*
- 26 Safety Aspects of Radio Frequency Effects in Humans from
Communication Devices** *Alan W. Preece*