



Millimeter Wave Communication Systems

By Kao-Cheng Huang, Zhaocheng Wang



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The aim of this book is to present the modern design and analysis principles of millimeter-wave communication system for wireless devices and to give postgraduates and system professionals the design insights and challenges when integrating millimeter wave personal communication system. Millimeter wave communication system are going to play key roles in modern gigabit wireless communication area as millimeter-wave industrial standards from IEEE, European Computer Manufacturing Association (ECMA) and Wireless High Definition (Wireless HD) Group, are on their way to the market. The book will review up-to-date research results and utilize numerous design and analysis for the whole system covering from Millimeter wave frontend to digital signal processing in order to address major topics in a high speed wireless system.

This book emphasizes the importance and the requirements of high-gain antennas, low power transceiver, adaptive equalizer/modulation, channeling coding and adaptive multi-user detection for gigabit wireless communications. In addition, the book will include the updated research literature and patents in the topics of transceivers, antennas, MIMO, channel capacity, coding, equalizer, Modem and multi-user detection. Finally the application of these antennas will be discussed in light of different forthcoming wireless standards at V-band and E-band.

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Editorial Review

Review

"The book will review up-to-date research results and utilize numerous design and analysis for the whole system covering from Millimeter wave frontend to digital signal processing in order to address major topics in a high speed wireless system." (DMN News Wire, 8 March 2011)

From the Back Cover

Millimeter wave communication systems are poised to play key roles in modern gigabit wireless communication; millimeter wave industrial standards from IEEE, Wireless Gigabit Alliance, European Computer Manufacturers Association, and Wireless High Definition Group are about to emerge. This is the first book to address complete and modern millimeter wave communication systems, covering their key components and explaining the critical issues that influence their performance. The authors, experts in the field of millimeter wave communications, provide powerful techniques for analyzing real millimeter wave systems, with an emphasis on new transceivers, new antennas, multiple-input multiple-output (MIMO), modulations, beam steering, beam forming, and frequency domain equalization.

Covering the whole system from millimeter wave front-end to digital signal processing, the book reviews up-to-date research results and numerous design methods and analysis for an entire high-speed wireless system. Major topics addressed are:

- Millimeter wave characteristics
- Modulations for millimeter wave communications
- Millimeter wave transceivers
- Millimeter wave antennas
- Millimeter wave MIMO
- Advanced diversity over MIMO channels
- Beam steering and beam forming
- Single-carrier frequency domain equalization

The authors emphasize the importance and the requirements of high-gain antennas, low-power transceivers, MIMO, modulation, frequency domain equalization, beam steering, and beam forming for gigabit wireless communications. In addition, they discuss new research and patents in transceivers, antennas, MIMO, channel capacity, equalizers, modems, beam steering, and beam forming. The application of these systems is explained in light of different forthcoming wireless standards for V-band and E-band use. Example designs are presented and the analysis of their performance is detailed.

Linking academic research with commercial applications, this practical resource gives wireless communication system professionals, millimeter wave professionals, and project managers the insights they need to reduce design and production costs when integrating these systems. This book is also written for graduate students who are interested in becoming familiar with the modern communication system concept at millimeter wave range.

About the Author

Kao-Cheng Huang, PhD, is Vice President at the Dharma Academy in Taiwan and an IEEE Senior

Member. Dr. Huang formerly worked as the MSc program leader at the University of Greenwich (UK), and senior research engineer at Sony Technology Centre, Germany. He received his PhD degree from University of Oxford (UK), and is the author of a previous book, *Millimetre Wave Antennas for Gigabit Wireless Communications* (Wiley). He holds several world and international patents in the area of millimeter wave communications.

Zhaocheng Wang, PhD, is Professor at the Department of Electronic Engineering, Tsinghua University, China. He has more than ten years of industry R&D experience in the areas of wireless and millimeter wave communications. He holds eighteen U.S./EU patents, some of which have been adopted by a plurality of international standards.

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