

Communications Engineering

This book is unique in presenting channels, techniques and standards for the next generation of MIMO wireless networks. Through a unified framework, it emphasizes how propagation mechanisms impact the system performance under realistic power constraints. Combining a solid mathematical analysis with a physical and intuitive approach to space-time signal processing, the book progressively derives innovative designs for space-time coding and precoding as well as multi-user and multi-cell techniques, taking into consideration that MIMO channels are often far from ideal.

Reflecting developments since the first edition was published, this book has been thoroughly revised, and now includes new sections and five new chapters, respectively dealing with receiver design, multi-user MIMO, multi-cell MIMO, MIMO implementation in standards, and MIMO system-level evaluation.

Features include:

- Extended introduction to multi-dimensional propagation, including polarization aspects.
- Detailed and comparative description of physical models and analytical representations of single- and multi-link MIMO channels, covering the latest standardized models.
- Thorough overview of space-time coding techniques, covering both classical and more recent schemes under information theory and error probability perspectives.
- Intuitive illustration of how real-world propagation affects the capacity and the error performance of MIMO transmission schemes.
- Detailed information theoretic analysis of multiple access, broadcast and interference channels.
- In-depth presentation of multi-user diversity, resource allocation and (non-)linear MU-MIMO precoding techniques with perfect and imperfect channel knowledge.
- Extensive coverage of cooperative multi-cell MIMO-OFDMA networks, including network resource allocation optimization, coordinated scheduling, beamforming and power control, interference alignment, joint processing, massive and network MIMO.
- Applications of MIMO and Coordinated Multi-Point (CoMP) in LTE, LTE-A and WiMAX.
- Theoretical derivations and results contrasted with practical system level evaluations highlighting the performance of single- and multi-cell MIMO techniques in realistic deployments.

Bruno Clerckx is Assistant Professor (Lecturer) at Imperial College London. He held research positions at Université catholique de Louvain, Stanford University, EURECOM and Samsung Electronics. His research interests cover wireless communications. He is the (co-)author of books, numerous scientific papers, standard contributions (3GPP LTE/LTE-A and IEEE802.16m) and patents.

Claude Oestges is Associate Professor with the Institute for Information and Communication Technologies, Electronics and Applied Mathematics (Université catholique de Louvain). His research interests cover wireless and satellite communications, with a specific focus on channel characterization and modeling. He is the (co-)author of two books and more than 170 scientific papers in international journals and conference proceedings.



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Channels, Techniques and Standards for
Multi-Antenna, Multi-User and
Multi-Cell Systems

