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Nota di contenuto	Preface -- 1. Introduction -- 1.1. Wireless transceiver functional description -- 1.2. Evolution of the wireless transceiver design -- 1.3. Contribution of the book -- 1.4. Organization -- 2. New Air Interfaces -- 2.1. Orthogonal frequency-division multiplexing -- 2.2. Single-carrier with frequency domain equalization -- 2.3. Multi-input multi-output OFDM -- 2.4. Code-division multiple access -- 2.5. Frequency-division multiple access -- References -- 3. Real Lie Front-Ends -- 3.1. Front-end architectures -- 3.2. Constituent blocks and their non-idealities -- 3.3. Individual non-idealities -- Referneces -- 4. Impact of the Non-Ideal Front Ends on the System Performance -- 4.1. OFDM system in the presence of carrier frequency domain and IQ imbalance -- 4.2. SC-FDE system in the presence of carrier frequency offset, sample clock offset and IQ imbalance -- 4.3. Comparison of the sensitivity of OFDM and SC-FDE to CFO, SCO and IQ imbalance -- 4.4. OFDM and SC-FDE systems in he presence of phase noise -- 4.5. OFDM system in the presence of clipping, quantization and nonlinearity --

4.6. SC-FDE system in the presence of clipping, quantization and nonlinearity -- 4.7. MIMO systems -- 4.8. Multi-user systems -- References -- 5. Generic OFDM System -- 5.1. Definition of the generic OFDM system -- 5.2. Burst detection -- 5.3. AGC setting (amplitude estimation) -- 5.4. Coarse timing estimation -- 5.5 Coarse CFO estimation -- 5.6. Fine timing estimation -- 5.7. Fine CFO estimation -- 5.8. Complexity of auto- and cross-correlation -- 5.9. Joint CFO and IQ imbalance acquisition -- 5.10. Joint channel and frequency-dependent IQ imbalance estimation -- 5.11. Tracking loops for phase noise and residual CFO/SCO -- References -- 6. Emerging Wireless Communication Systems -- 6.1. IEEE 802.11n -- 6.2. 3GPP Long-term evolution -- Appendices -- A. MMSE Linear Detector -- B. ML Channel Estimator -- C. Matlab Models of Non-Idealities -- D. Mathematical Conventions -- E. Abbreviations -- Index.

## Sommario/riassunto

The desire to build lower cost analog front-ends has triggered interest in a new domain of research. Consequently the joint design of the analog front-end and of the digital baseband algorithms has become an important field of research. It enables the wireless systems and chip designers to more effectively trace the communication performance with the production cost. Digital Compensation for Analog Front-Ends provides a systematic approach to designing a digital communication system. It covers in detail the digital compensation of many non-idealities, for a wide class of emerging broadband standards and with a system approach in the design of the receiver algorithms. In particular, system strategies for joint estimation of synchronization and front-end non-ideality parameters are emphasized. The book is organized to allow the reader to gradually absorb the important information and vast quantity of material on this subject. The first chapter is a comprehensive introduction to the emerging wireless standards which is followed by a detailed description of the front-end non-idealities in chapter two. Chapter three then uses this information to explore what happens when the topics introduced in the first two chapters are merged. The book concludes with two chapters providing an in-depth coverage of the estimation and compensation algorithms. . Presents a global, systematic approach to the joint design of the analog front-end compensation, channel estimation, synchronization and of the digital baseband algorithms . Describes in depth the main front-end idealities such as phase noise, IQ imbalance, non-linearity, clipping, quantization, carrier frequency offset, sampling clock offset and their impact on the modulation . Explains how the non-idealities introduced by the analog front-end elements can be compensated digitally . Methodologies are applied to the emerging Wireless Local Area network and outdoor Cellular communication systems, hence covering OFDM(A), SC-FDE and MIMO . Written by authors with in-depth expertise developed in the Wireless Research group of IMEC and projects covering the main broadband wireless standards. This book is a valuable reference for wireless system architects and chip designers as well as engineers or managers in system design and development. It will also be of interest to researchers in industry and academia, graduate students and wireless network operators.