



# Multi-Carrier and Spread Spectrum Systems: From OFDM and MC-CDMA to LTE and WiMAX

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## **Multi-Carrier and Spread Spectrum Systems: From OFDM and MC-CDMA to LTE and WiMAX**

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The technological progress in multi-carrier (MC) modulation led orthogonal frequency division multiplexing (OFDM) to become an important part of beyond 3G cellular mobile communication standards, including LTE and WiMAX. In addition, the flexibility offered by the spread spectrum (SS) and time division multiplexing (TDM) techniques motivated many researchers to investigate several MC combined multiple access schemes, such as MC-CDMA, OFDMA and MC-TDMA. These schemes benefit from the advantages of each sub-system and offer high flexibility, high spectral efficiency, simple detection strategies and narrow-band interference rejection capability.

*Multi-Carrier and Spread Spectrum Systems* is one of the first books to describe and analyze the basic concepts of multi-carrier OFDM transmission and its combination with spread spectrum (MC-CDMA). The different architectures and detection strategies as well as baseband-related transceiver components are explained. This includes topics like FEC channel coding and decoding, modulation and demodulation (IFFT/FFT), digital I/Q-generation, time and frequency synchronisation, channel estimation, frequency domain equalization and RF aspects such as phase noise and non-linearity issues. Concrete examples of its applications for cellular mobile communication systems (B3G/4G) are given. Further derivatives of MC-SS (such as OFDMA, SS-MC-MA and DFT-spread OFDM) and their corresponding applications in the LTE, WiMAX, WLAN and DVB-RCT standards are detailed. Capacity and flexibility enhancements of multi-carrier OFDM systems by different MIMO diversity techniques such as space time/frequency coding (STC, SFC) and software defined radio concepts are also described.

Written in a highly accessible manner this book provides a unique reference on the topics of multi-carrier and spread spectrum communications, assisting 4G engineers with their implementation.

- Fully updated new edition of successful text, including two new chapters on LTE and WiMAX
- Describes in detail new applications of OFDM in mobile communication standards
- Examines all multi-carrier spread spectrum schemes, with in-depth analysis, from theory to practice
- Introduces the essentials of important wireless standards based on multi-carrier/spread spectrum techniques.

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