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Wireless Broadband Access Technologies

MC-CDMA, SC-FDMA, and MC-CDMA-FDMA



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Preface

Due to the rapid development in technology, researchers are looking towards high speed wireless technologies which are suitable for high quality multimedia services. One of the most attractive and effective technologies which is used in fourth generation is Multi Carrier Code Division Multiple Access (MC-CDMA); this technology has many advantages such as robustness against frequency selective fading and high scalability in possible data transmission rate.

From other point of view, MC-CDMA has drawback in transmission of signals because they have high Peak to Average Power Ratio (PAPR) which means high level of power compared to the average power of the transmitted signal. There are many methods to reduce PAPR of transmission but this book presents a new way depending on the uplink of Long Term Evolution system (LTE) which is called Single Carrier Frequency Division Multiple Access (SC-FDMA).

This book consists of seven chapters, which step by step in detail highlight the design of MC-CDMA-FDMA perform in achieving the lowest PAPR.

Chapters 1-2 of this book introduce the evolution of mobile phones and present classifications of Code Division Multiple Access (CDMA) techniques that contain the pure and hybrid CDMA techniques including all of the specifications and system models.

Chapters 3-5 describe all the basics of MC-CDMA system and SC-FDMA system depending on all the parameters that are related to these two systems with the required equations, PAPR equations and derivations in MC-CDMA and SC-FDMA systems are also derived and included. Another point which is highlighted in these chapters is the simulation and results of these systems with different situations and cases appended by the simulation results of PAPR for MC-CDMA and SC-FDMA.

Chapter 6 presents the design of MC-CDMA-FDMA system which is formed by combining MC-CDMA and SC-FDMA. This system is proposed to reduce PAPR of MC-CDMA system. The MC-CDMA-FDMA system performance is presented and discussed through the simulation results.

The final Chapter focuses on the effect of FFT size in MC-CDMA, SC-FDMA and MC-CDMA-FDMA systems in terms of the optimum number of points. These systems are then evaluated and tested with various modulation techniques such as PSK and QAM.