

Preface

Recently, there has been a massive growth in the number of mobile users and their traffic, with the data traffic volume almost doubling every year but users are very limited to the service providers' resources. Increasing the utilization of the existing spectrum can significantly improve network capacity, data rates, and user experience. Spectrum sharing enables wireless systems to harvest under utilized swathes of spectrum, which vastly increases the efficiency of spectrum usage. Making spectrum more widely available can provide significant gain in mobile broadband capacity only if those resources can be aggregated efficiently with the existing commercial mobile system resources. Carrier aggregation (CA) is one of the most distinct features of 4G systems including Long Term Evolution-Advanced (LTE-Advanced). This volume introduces an efficient resource management approach for future spectrum sharing systems. The book focusses on providing optimal resource allocation framework based on carrier aggregation to allocate multiple carriers' resources efficiently among mobile users with elastic and inelastic traffic in cellular networks. The allocation policy is based on utility proportional fairness, where the fairness among users is in utility percentage of the application running on the user equipment (UE). Resource allocation (RA) with CA is proposed to allocate single or multiple carriers' resources optimally among users subscribing for mobile services. Each user is guaranteed a minimum quality of service (QoS) that varies based on the user's application type. Furthermore, it provides an optimal traffic-dependent pricing mechanism that could be used by network providers to charge mobile users for the allocated resources. The book provides different resource allocation with carrier aggregation solutions, for different spectrum sharing scenarios, and compares them. The provided solutions consider the diverse quality of experience requirement of multiple applications running on the users' equipment since different applications require different application performance. In addition, the book addresses the resource allocation problem for spectrum sharing systems that require user discrimination when allocating the network resources. Furthermore,

an application-aware resource block (RB) scheduling with CA is proposed to assign RBs of multiple component carriers to users' applications based on a utility proportional fairness scheduling policy.

Arlington, VA, USA
Blacksburg, VA, USA
Arlington, VA, USA
April 2017

Haya Shajaiah
Ahmed Abdelhadi
Charles Clancy

Resource Allocation with Carrier Aggregation in Cellular
Networks

Optimality and Spectrum Sharing using C++ and
MATLAB

Shajaiah, H.; Abdelhadi, A.; Clancy, T.C.

2018, XVI, 201 p. 65 illus., 62 illus. in color., Hardcover

ISBN: 978-3-319-60539-5