

# Preface

In view of cost-effective implementations, scalable infrastructure and elastic capacity on demand, *virtualization* and *cloud computing* are now becoming the cornerstones of any successful IT strategy. Emerging cloud computing technologies, such as the *software-defined networking* and *Internet of things*, have been thoroughly investigated for data computing networks, while less attention has been paid to radio access network virtualization, be it hardware or software elements.

Today, the focus of research in wireless and cellular networks has shifted to *virtualization* and *cloud* technologies, so that incorporation of cloud technologies, network functions virtualization, and software-defined networking is essential part in the development process of 5G cellular communications system, expected to be commercialized by 2020. These technologies are expected to affect different parts of cellular networks including the core network and radio access network (RAN).

Cloud RAN has emerged as a revolutionary approach to implementation, management, and performance improvement of next-generation cellular networks. Combined with other technologies, such as small cells, it provides a promising direction for the zettabyte Internet era. The virtualization of RAN elements is stressing the wireless networks and protocols, especially when the large-scale cooperative signal processing and networking, including signal processing in the physical layer, scheduling and resources allocation in the medium access control layer, and radio resources managements in the network layer, are centralized and cloud computed.

The main motivation for offering this book stems from the observation that, at present there is no comprehensive source of information about cloud RAN and its interplay with other emerging technologies for network automation, such as the software-defined networking, network functions virtualization, and wireless

virtualization. In addition to providing the latest advances in this area, we also include research potentials and market trend in this field. We believe that it is valuable to bring basic concepts and practical implementation of several related areas together, to facilitate a better understanding of the entire area.

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