Chapter 9
Cognitive Radio Network-Based Design and Security Challenges in 5G Communication

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ABSTRACT

This chapter deals with the main development challenges of 5G network. The 5G terminals can be made as reconfigurable multimode and cognitive radio enabled. Such networks will have software defined radio modulation schemes. The 5G mobile networks will focus on the development of the user terminals where the terminals will have access to different wireless technologies at the same time and will combine different flows from different technologies. It is beneficial to deploy cloud-computing platforms running on general-purpose hardware, leading to a cloud-RAN system. This chapter is focused on the challenges and benefits of implementing reconfigurable signal processing algorithms on a cloud-computing platform and address various security issues with cognitive radio networks.

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INTRODUCTION

The mobile device has become more than a communication device in modern world so that the computation and communication are ready to serve the user in an intelligent way. Intelligent mobile devices can create a new platform that enables ubiquitous sensing, computing, and communication (Nekovee, 2010; Haykin, 2005). This chapter explores future mobile systems with emphasis on reconfigurability based on cognitive and software defined radios (SDR) (http://www.sdrforum.org; http://www.ieee802.org/21/ - IEEE 802.21: Media Independent Handover). The investigations are focused on a 5G (Fifth Generation) network architecture consisting of reconfigurable multi-technology core and a single fully reconfigurable terminal able to autonomously operate in different heterogeneous access networks. This network can be enforced by nanotechnology, cloud computing and all IP Platforms. As a long-term goal, it is beneficial to deploy cloud-computing platforms. This chapter is focused on the challenges and benefits of implementing reconfigurable signal processing algorithms on a cloud-computing platform and have addressed various security issues with cognitive radio networks (CRN) (Sun, 2008; IEEE Communication Society, Patent No. P802.22, 2011; Ghasemi, 2008; Akyildiz, 2008). This chapter deals with cognitive radio access networks with recent approaches for 5G such as massive multiple-input, multiple-output (MIMO) and multiple radio access technologies. With the development in nanotechnology, the mobile phones can act as intelligent sensors that have applications in many industries such as transportation, communications, medicine and safety. Nanotechnology will have considerable impacts on both mobile device as well as core network as follows:

- The mobile device has become more than a communication device in modern world; computation and communication are ready to serve the user in an intelligent way. Mobile devices together with the intelligence, embedded in human environments, will create a new platform that enables ubiquitous sensing, computing, and communication. With nanotechnology mobile phones can act as intelligent sensors that have applications in many industries, among them transportation, communications, medicine and safety.
- The core network requires high speed and a reliable capacity to manipulate and interopereate increasing number of heterogeneous access technologies. At present, nanotechnologies are used in Digital Signal Processing (DSP) Fabrication, introducing new perceptions in DSP designing that increases the overall system speed & capacity using FPGA.
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Rashmi Bhardwaj and Aashima Bangia (2020). *Forensic Investigations and Risk Management in Mobile and Wireless Communications* (pp. 51-79).