Chapter 20
QoS-Aware Green Communication Strategies for Optimal Utilization of Resources in 5G Networks

Ganesh Prasad
National Institute of Technology Silchar, India

Deepak Mishra
https://orcid.org/0000-0002-3225-6495
Linköping University, Sweden

Ashraf Hossain
National Institute of Technology Silchar, India

ABSTRACT

With increase in demand of data traffic with no compromise on the underlying quality of service (QoS), the coexistence problem arises due to high electricity consumption by the network architecture which results in a huge CO2 emission and thereby causing various health hazards. Efficient utilization of the resources can reduce the cost of power consumption which will increase the economy-characteristics of the network. The resource consumption can be reduced under an intelligent technology-neutral policies which optimizes the deployment of the network architecture along with their transmit power paving the way for fifth generation (5G) in green wireless communications. On another front, the ultra-dense deployment of the small cells can increase the frequency reuse factor as well as help in reducing the energy consumption. This chapter designs the energy efficient networks while satisfying the underlying QoS by joint optimization of available resources depending on the interoperability challenges in terrestrial, underwater acoustic, and free space optical (FSO) communications.

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INTRODUCTION

This chapter describes a quality-of-service (QoS)-aware energy-efficient network in terrestrial, underwater acoustic and free space optical (FSO) communications according to the interoperability challenges in their transmission links as shown in Figure 1.

The demand of data is increasing day by day without any compromise with QoS. For improving the coverage of the user equipments (UEs), various works have been done on the deployment of base stations (BSs) in cellular networks. Deployment in grid-based network where the shape of the cells is hexagonal is less tractable (ElSawy, Hossain & Haenggi, 2013). Placement of BSs based on homogeneous Poisson point process (HPPP) and binomial point process (BPP) is realistic (Andrews, Baccelli & Ganti, 2011; Srinivasa & Haenggi, 2010), but deterministic deployment of BSs using the distribution of UEs gives significant performance enhancement (Su et al, 2014). The power consumption in the cellular network is nearly 1% of the world wide total energy consumption (Fettweis, & Zimmermann, 2008). Therefore, it

Figure 1. Optimal resource allocation in cooperative underwater acoustic, FSO, and terrestrial networks while tackling the underlying interoperability challenges