Ph: 9585554590, 9585554599
Email: support@salemsmartreach.com
URL: www.salemsmartreach.com

Uplink Soft Frequency Reuse for Self-Coexistence of Cognitive Radio Networks

Abstract:

The depletion of usable radio frequency spectrum has stimulated increasing interest in dynamic spectrum access technologies, such as cognitive radio (CR). In a scenario where multiple co-located CR networks operate in the same swath of white-space (or unlicensed) spectrum with little or no direct coordination, co-channel self-coexistence is a challenging problem. In this paper, we focus on the problem of spectrum sharing among coexisting CR networks that employ orthogonal frequency division multiple access (OFDMA) in their uplink and do not rely on inter-network coordination. An uplink soft frequency reuse (USFR) technique is proposed to enable globally power-efficient and locally fair spectrum sharing. We frame the self-coexistence problem as a non-cooperative game. In each network cell, uplink resource allocation (URA) problem is decoupled into two subproblems: subchannel allocation (SCA) and transmit power control (TPC). We provide a unique optimal solution to the TPC subproblem, while presenting a low-complexity heuristic for the SCA subproblem. After integrating the SCA and TPC games as the URA game, we design a heuristic algorithm that achieves the Nash equilibrium in a distributed manner. In both multi-operator and single-operator coexistence scenarios, our simulation results show that USFR significantly improves self-coexistence in spectrum utilization, power consumption, and intra-cell fairness.