Abstract

Small cells such as Femtocell have proved to be a cost effective solution to improve cellular connectivity in enterprise and residential deployments. Even though femtocells are inherently energy efficient, their operation in grid energy deprived rural and remote regions will require significant improvement in energy efficiency. Rural and remote are characterized by low mobile user density/data demands and hence more attention should be given on improving the energy efficiency and network uptime rather than on maximizing the system throughput. In this paper, we consider a rural femtocell network powered by solar cells and battery subsystem. The energy consumption of a femtocell is dependent upon the number of mobile users associated with it. Keeping this in mind, we develop an efficient spectrum and power allocation scheme called power spreading which when used with Max Reference Signal Received Power (RSRP) based cell selection scheme results in a significant improvement in network uptime. Additionally, this scheme has shown to improve the energy efficiency of the network without compromising the mobile users’ bitrates. The obtained results are verified using extensive simulations.
References


Index Terms

Computer Science  Power Systems
Keywords

Femtocell, Cell Selection Scheme, Reference Signal Received Power, Power Spreading, Network Uptime.