

Software-defined Energy Efficient Base Station Control for Green Cellular Networks

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Energy efficiency of cellular networks has received remarkable attention recently with exponentially increasing deployments and rising concerns of the harmful effects to the environment caused by CO₂ emissions emitted from base stations. In order to tackle the issues of mounting deployments and large energy consumption of base stations, it is integral to devise schemes to improve energy efficiency in cellular networks. We propose network function virtualization of cell management on SDN architecture. It provides significant benefits over current cellular networks that suffer from inflexible management and complex control. We develop a cell management algorithm on the architecture that can effectively control the sleep and awake modes of base stations and perform handover operations in a cellular network. Our trace-driven evaluation results show that the proposed control architecture and the cell management algorithm incur less control message exchanges, more cells in a sleep mode for longer durations, and less cell status changes than existing cellular energy saving approaches, achieving significant energy savings.