
Network Synchronization for Mobile Device-to-Device Systems

Abstract:

This paper studies the synchronization problem for mobile cellular device-to-device (D2D) networks. Depending on the number of devices that are in coverage of the base station, the D2D environment can be divided into three categories where the partial-coverage and out-of-coverage are challenging scenarios and thus are the focus of this paper. First, we discuss five main challenges imposed on the synchronization problem in mobile D2D networks. More specifically, there are different challenges in the two coverage scenarios, since they do not have exactly the same synchronization objectives. Second, we propose a low-complexity Adaptive distRibuted nEtwork Synchronization (ARES) algorithm to address the five challenges. The design principles and the theories behind the ARES scheme are also analyzed in detail. Finally, we provide comprehensive simulations to evaluate different synchronization schemes, where the proposed ARES mechanism shows very promising performance.