Energy Efficiency Optimization for D2D Communication with Statistical Channel State Information and QoS Awareness

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Abstract

Since the energy efficiency (EE) optimization of communication systems brings extremely significant economic benefits in mobile communication networks, this study conducts the device-to-device (D2D) communication EE optimization considering statistical channel state information (CSI) and quality of service (QoS) awareness. First of all, a D2D access control strategy is implemented to determine the set of cellular users that can all be feasible for each pair of D2D users. However, as the instantaneous channel state information is often unavailable, a modified access control strategy based on statistical channels is proposed. Subsequently, in the power control issue, an iterative power control algorithm with the constraint of users' QoS awareness is put forward to obtain the optimal transmit power combination based on partial fractional programming. Finally, a rapid channel allocation algorithm is provided to solve the channel assignment problem, resulting in an enhancement of the access rate and a reduction of complexity. Simulation results show that: i) Our proposed algorithm has advantages in enhancing the EE for D2D communication with statistical CSI; ii) In the case of increasing EE, the user's QoS awareness is guaranteed; iii) The algorithm increases the access rate of D2D users while achieving resource allocation fairness.

Keywords: D2D communication, EE, statistical channel state information, QoS awareness.

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