

Preface

An explosion of data traffic has been observed in cellular networks in recent years due to the booming growth of mobile applications. Various mobile applications, such as video streaming, document synchronization, and social networks, on such portable devices have generated a large amount of data traffic. Device-to-device (D2D) communication has been recently proposed as a promising technique to improve resource utilization of cellular networks by offloading the traffic through base station to local direct links among devices. However, the opportunities of D2D communication are limited because of low-quality D2D links. Cooperative communication (CC) has shown great advantages in offering high capacity and reliability for wireless communication by employing several single-antenna devices to form a virtual antenna array, which motivates us to enhance the D2D communication using CC technology. The objective of this brief is to present the architecture of cooperative D2D communication, and to examine recent advances in related research topics. An extensive review of D2D communication is provided, followed by the motivations and architecture of cooperative D2D communication. We investigate the problem of maximizing the minimum transmission rate among multiple D2D pairs in cognitive radio cellular networks by jointly considering relay assignment and channel allocation. Since energy efficiency is critical for mobile devices under energy constraints, we study the lifetime maximization problem of cooperative D2D communication by an optimal dynamic allocation of resources in terms of power, channel, cooperative relay and transmission time fraction. Furthermore, we extend the proposed cooperative D2D communication by integrating new technology of network coding, and applying for a different traffic mode of broadcast. Extensive simulations results show that our proposed solutions outperforms existing work by providing significant performance enhancement to D2D communication.

August, 2014

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Cooperative Device-to-Device Communication in
Cognitive Radio Cellular Networks

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2014, XI, 78 p. 39 illus., Softcover

ISBN: 978-3-319-12594-7