Title: Leveraging Peer-to-Peer Energy Sharing for Resource Optimization in Mobile Social Networks

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Abstract: Mobile Social Networks (MSNs) enable the interaction of mobile users in the vicinity through various short-range wireless communication technologies (e.g., Bluetooth, Wi-Fi) and let them discover and exchange information directly or in ad hoc manner. Despite their promise to enable many exciting applications, limited battery capacity of mobile devices has become the biggest impediment to these applications. The recent breakthroughs in the areas of wireless power transfer (WPT) and rechargeable lithium batteries promise the use of peer-to-peer (P2P) energy sharing (i.e., the transfer of energy from the battery of one member of the mobile network to the battery of another member) for the efficient utilization of scarce energy resources in the network. However, due to uncertain mobility and communication opportunities in the network, resource optimization in these opportunistic networks is very challenging. In this dissertation, we study energy utilization in three different applications in Mobile Social Networks and target to improve the energy efficiency in the network by benefiting from P2P energy sharing among the nodes. More specifically, we look at the problems of (i) optimal energy usage and sharing between friendly nodes in order to reduce the burden of wall-based charging, (ii) optimal content and energy sharing when energy is considered as an incentive for carrying the content for other nodes, and (iii) energy balancing among nodes for prolonging the network lifetime. We have proposed various novel protocols for the corresponding applications and have shown that they overcome the state-of-the-art solutions and improve the energy efficiency in MSNs while the application requirements are satisfied.

Bio: Aashish Dhungana is a PhD candidate at the Virginia Commonwealth University.