Topic:

Energy-Spectrum Efficiency Tradeoff in Mobile Multimedia Sensor Networks

Abstract:

In this work, we investigate the properties of energy-efficiency (EE) and spectrum-efficiency (SE) for mobile multimedia sensor networks by developing an energy-spectrum-aware scheduling (ESAS) scheme. To describe a practical mobile scenario, we deploy a random walk mobility model in which each senor can randomly and independently select its mobility direction and velocity. Through rigorous analysis and extensive simulations, we demonstrate that the node mobility is beneficial to EE but harmful to SE. The contributions of this work are twofold: 1) We propose an ESAS scheme with a dynamic transmission range, which significantly outperforms the previous minimum-distortion multimedia scheduling from the aspect of joint EE and SE performance; 2) We derive an achievable EE-SE tradeoff range and a tight upper/lower bound with respect to energy-spectrum efficiency index for various node velocities. Therefore, we believe that this work is helpful to shed insights on the fundamental design guidelines on building an energy and spectrum efficient mobile multimedia sensor network.