

Wireless Networks

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Protocol Design and Analysis for Cooperative Wireless Networks

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Preface

Cooperative wireless networks have emerged as a promising technology that allows wireless devices to take advantage of diversity and the broadcast nature of wireless medium. Nonetheless, some important issues remain to be addressed to enable practical implementation. In particular, with the fast-growing mobile traffic and rising energy costs, energy saving needs to be taken into account in the design of cooperative protocols. In addition, many designs and analyses assume that the locations of cooperative wireless nodes are deterministic or known a priori. However, due to user mobility and/or network dynamics, the node locations are spatially random. Hence, this feature should be properly incorporated into the protocol design and analysis for cooperative wireless networks.

In this book brief, we focus on the design and analysis of protocols for cooperative wireless networks, especially, at the medium access control (MAC) layer and cross-layer design between the MAC layer and the physical layer. It first provides a comprehensive review of existing studies in the literature and points out the problems that are worth further investigation. Then, it introduces several novel solutions for cooperative wireless network protocols, aiming to reduce energy consumption and address spatial random distribution of wireless nodes. For each solution, it gives a clear system model and problem formulation, details of the proposed cooperative schemes, comprehensive performance analysis, and extensive numerical and simulation results that validate the analysis and examine the performance under various conditions. At the end of this book brief, we also highlight several interesting directions on cooperative wireless networks that deserve future exploration.

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