Proposition de recherche doctorale

Evaluation and Optimization in Dense Wireless Networks

Mots clés :
- Directeur de thèse : philippe JACQUET
- Co-encadrant(s) :
- Unité de recherche : INRIA-Paris
- Ecole doctorale : École Doctorale Informatique, Télécommunications, Électronique de Paris
- Domaine scientifique principal: Divers

Résumé du projet de recherche (Langue 1)

The main objective of this thesis is to analyze the performance of wireless networks under various scenarios: stationary, mobile, single-hop and multi-hop networks. Our main focus in the first two parts of this thesis is on the geometric placement of simultaneous transmitters in the network. In the first part, we study the impact of the placement of transmitters, by the medium access control scheme, on the performance of single-hop wireless network. We establish a general framework and study the optimal placement of transmitters in the network. Later we compare this optimal placement with placements obtained by random point processes such as Poisson point process, ALOHA, node coloring and CSMA. Our analysis allows us to evaluate the performance gains of a highly managed medium access control that would be required to implement the optimal placement of transmitters. For instance, we show that the capacity of this highly managed medium access control cannot be more than twice the capacity of a low managed medium access control such as ALOHA. Later, we use analytical methods to evaluate the heuristics for optimizing the capacity and coverage in an existing cellular network by optimally locating additional base stations. In the second part, we extend our analysis to multi-hop wireless network where we evaluate the optimum transmission range and network throughput capacity with various medium access control schemes. Our analyses in the first two parts of this thesis allow us to gain perspectives into the theoretical limits on the performance of an optimized medium access control in single-hop and multi-hop wireless network. In the last part, we shift our focus to capacity-delay tradeoff in mobile wireless network. We propose a georouting scheme and study its scaling properties. Using a realistic mobility model and the information available at mobile nodes, our scheme achieves a delay which is bounded by a constant with network capacity that increases quasi-linearly when the number of nodes in the network increases and approaches infinity.