

Proposta di Tesi di Laurea Magistrale per laureandi dell'area dell'Ingegneria dell'Informazione (Telecomunicazioni, Informatica, Elettronica, Automazione)

Tutti gli interessati sono pregati di contattare il Prof. Boggia (gennaro.boggia@poliba.it) inviando il proprio CV con l'elenco degli esami sostenuti e la votazione.

Ambito: Telecomunicazioni

Professori di riferimento: Pietro Camarda, Gennaro Boggia, Luigi Alfredo Grieco

Inizio: 01/08/2014; **Durata:** 10 mesi

Luogo: Aalborg (Danimarca), presso Nokia Networks e Aalborg University

Note: Prevista una borsa di studio da parte di Nokia; l'Università aiuterà nel trovare un alloggio.

Dettagli tesi: Lavoro parte della collaborazione tra Nokia Networks, Aalborg University e Universidad de Málaga.

Lingua: Inglese

Titolo: *Analysis of Heterogeneous Networks using Poisson Point Processes*

Abstract

Wireless networks are fundamentally limited by the intensity of the received signals and by their interference. Both quantities depend on the spatial location of the nodes. Cellular networks have been typically modeled by placing the base stations on a grid, with mobile users either randomly scattered or placed deterministically. However, the hexagonal grid model does not capture the irregularities of real networks and is not mathematically tractable. In the last decade, more tractable models using stochastic geometry, with base stations and users randomly placed according to a Poisson Point Process (PPP), have been proved to approximate well the Signal to Interference and Noise Ratio (SINR) in a cellular network. Today's macro-only networks will not be able to accommodate subscriber capacity in 4G networks. What's needed is a heterogeneous network (HetNet), consisting of a mix of macro cells and low-power nodes such as micro, pico and femto cells. In this project we focus on the co-channel deployment of pico cells in existing macro-layer networks, with macro and pico sharing the same carrier. Such deployments in conjunction with interference management techniques can provide significant performance gains, and further investigation of the theoretical limits of these networks is still needed.

Project objectives:

The aim of the project is to analyze the performance of a co-channel HetNet modeled with stochastic geometry. In particular, the steps of the project are: 1. Study of LTE-Advanced and HetNets; 2. Study of stochastic geometry and Poisson Point Processes; 3. Compilation of analytical results in the literature for the performance of a HetNet modeled with PPP. Parameters of interest include, but are not limited to: distance to the serving cell, number of users, association probability, capacity, achievable user rate...; 4. Design and implementation in MATLAB of a HetNet with co-channel macro and pico cells and enhanced Inter-Cell Interference Coordination (eICIC) techniques; 5. Comparison of the analytical and simulated results, including the sensitivity analysis to the eICIC parameters

Student profile: *Good background on wireless communications and communication theory; random signals and stochastic processes; very good MATLAB programming skills*