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On the Shannon Rate in a Poisson-Voronoi Cellular Network

Abstract

This talk is focused on the analytical modeling of the downlink of cellular networks. It considers a large network where base stations form a planar Poisson point process and where each user associates to the closest base station.

Each user is hence served by the base station which is the nucleus of the Voronoi cell containing its location. This observation allows one to determine the law of the Signal to Interference and Noise Ratio (SINR) and hence that of the Shannon rate obtained by this typical user.

Several variants can be handled as well: other association rules; multi-tier rather than single tier networks; more general point processes than Poisson; networks with shadowing.

Biographical Sketch

Francois Baccelli is Simons Math+X Chair in Mathematics and ECE at UT Austin. His research directions are at the interface between Applied Mathematics (probability theory, stochastic geometry, dynamical systems) and Communications (network science, information theory, wireless networks). He is co-author of research monographs on point processes and queues (with P. BrÃ©maud); max plus algebras and network dynamics (with G. Cohen, G. Olsder and J.P. Quadrat); stationary queuing networks (with P. BrÃ©maud); stochastic geometry and wireless networks (with B. Blaszczyszyn). Before joining UT Austin, he held positions at INRIA, Ecole Normale SupÃ©rieure, Ecole Polytechnique, UC Berkeley and the Newton Institute. He received the France TÃ©lÃ©com Prize of the French Academy of Sciences in 2002 and the ACM Sigmetrics Achievement Award in 2014. He is a co-recipient of the 2014 Stephen O. Rice Prize and of the Leonard G. Abraham Prize Awards of the IEEE Communications Theory Society.! He is a member of the French Academy of Sciences and part time researcher at INRIA.