ECE Department Seminar
Communications and Networking Lab (CNL)

Date: April 22, 2009
Time: 3:00-4:00 pm
Location: Robinson B Rm 111

Statistical Interference Modeling and Coexistence Strategies in Cognitive Wireless Networks

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Abstract - Cognitive radio is a novel approach for better utilization of the scarce, already packed but highly underutilized radio spectrum. Environment-aware unlicensed secondary wireless devices are envisioned to share the spectrum with the primary licensed network, provided that their operation does not impose unmanageable interference on the primary nodes.

To achieve this coexistence goal, interference modeling is of great significance. Interference, in general, has a stochastic nature not only due to randomness in the propagation channel, but also due to the random geographic dispersion of nodes. A statistical representation for interference, in which the power levels of the secondary nodes influence the parameters of the model, is, thus, of considerable interest in analysis and design of cognitive wireless network.

In this seminar, we present our research on using stochastic geometry and spatial point processes for modeling the coexisting primary and secondary networks. We model these networks using spatial bivariate Poisson processes and obtain statistical properties of distances in these processes. Using this model, we obtain two different models for the aggregate interference on the primary nodes. We propose power control strategies for the secondary network which assure the satisfaction of interference constraint at the primary nodes. We also find the lower bound of (i.e. achievable) throughput for the power-controlled secondary nodes. We use the statistical properties of distances between secondary nodes and find an upper bound for the interference of secondary network on an arbitrary secondary node and thereby a lower bound for its throughput. We show that the approach is applicable for finding the throughput in a general power-constrained random network.

Bio- Alireza Babaei is a PhD candidate in the Electrical and Computer Engineering department of George Mason University. His area of active research is on stochastic processes, modeling and performance analysis of wireless networks and mathematical programming. He is the recipient of outstanding graduate student award in Volgenau School of Information Technology and Engineering in 2009 and is a student member of IEEE.