Notice and Invitation

Oral Defense of Doctoral Dissertation
The Volgenau School of Engineering, George Mason University

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Bachelor of Science, Shiraz University, Iran, 2009
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Modeling and Algorithms for Cell Selection in Multi-Tier Wireless Networks

Wednesday, April 11, 2018, 11:00 am - 1:00 pm
Engineering Building, Room 2302
All are invited to attend.

Committee:

Dr. Bijan Jabbari
Dr. Robert Simon
Dr. Brian L. Mark
Dr. Avesta Sasan

Abstract

The emerging of small cells which are integrated hierarchically with the larger cells is shaping the architecture of wireless networks. This heterogeneous cellular network structure is an assuring architecture to enhance the capacity and reliability of the wireless networks, especially when it comes to the new generation of networks such as 5G. Given the diverse set of performance criteria, there is an urging need for a more general model to evaluate the performance and capacity of this multi-tier wireless network architecture. While the contemporary models are realistic in modeling the inherent node irregularity, they fall short in modeling the effect of interference management techniques, which typically introduce some form of spatial interaction among different cells. This dissertation proposes a novel analytical framework based on stochastic geometry to capture this inter-tier relationship and to evaluate multi-tier networks.

We first develop a new model for multi-tier networks that envisions the spatial dependency between base stations (BS) of multiple tiers. The ultra-dense distribution of small cells allows the derivation of simple expressions for the signal-to-noise-ratio (SINR) coverage probability and the network throughput. Under the developed model, we propose the multi-criteria cell association scheme and acquire the optimal association bias for the best SINR and the data rate coverage. Finally, considering the users arrival, we propose an online cell selection algorithm based on the cooperative game between a subset of potential server cells. It is worth noting that confining the alternative servers improves the speed and efficiency of the algorithm.