



## Energy Harvesting Networks and Multihop Wireless Networks: Perpetual Operation and Throughput Optimization

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ISN Seminar Speaker:  
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### Abstract

Energy Harvesting Networks and Multihop Wireless Networks Perpetual Operation and Throughput Optimization Wireless networks of low-data-rate energy harvesting devices and of high-data-rate nodes both require using simple and distributed algorithms. In this talk, we provide an overview of the design considerations for Energy Harvesting Active Network Tags (EnHANTs <http://enhants.ee.columbia.edu>). We discuss the design and performance evaluation of resource allocation algorithms for networks of such tags and present recent experimental results. Then, we focus on topological aspects of throughput optimization in wireless networks. In these networks simple greedy scheduling algorithms (known as Greedy Maximal Scheduling GMS) are guaranteed to achieve only a fraction of the maximum possible throughput. However, it was recently shown that in networks in which the Local Pooling conditions are satisfied, GMS achieves 100% throughput. Moreover, in networks in which the  $\sigma$ -Local Pooling conditions hold, GMS achieves  $\sigma\%$  throughput. We present several recent results related to Local Pooling and focus on identifying the specific network topologies that satisfy these conditions. In particular, we provide the first characterization of all the network graphs in which Local Pooling holds under primary interference constraints (in these networks GMS achieves 100% throughput). Moreover, we study the performance of GMS in interference graphs and show that in certain specific topologies its performance could be very bad. We conclude by discussing applications to frequency allocation, scheduling, and routing in wireless networks. The results in the area of energy harvesting are based on joint works with M. Gorlatova, R. Margolies, P. Kinget, J. Kymissis, and D. Rubenstein (Columbia). The results in the area of throughput optimization are based on joint works with B. Birand (Columbia), M. Chudnovsky (Columbia), B. Ries (Paris Dauphine), P. Seymour (Princeton), and Y. Zwols (McGill).

### Biography

Gil Zussman received the Ph.D. degree in Electrical Engineering from the Technion Israel Institute of Technology in 2004. Between 2004 and 2007 he was a Postdoctoral Associate at MIT. He is an Assistant Professor of Electrical Engineering at Columbia University, and his research interests are in the area of wireless networks. He has been an associate editor of IEEE Transactions on Wireless Communications and Ad Hoc Networks, and the TPC co-chair of IFIP Performance 2011. He is a co-recipient of 4 best paper awards including the ACM SIGMETRICS 2006 Best Paper Award and the 2011 IEEE Communications Society Award for Advances in Communication. He was a member of a team that won the 1st place in the 2009 Vodafone Americas Foundation Wireless Innovation competition and is a recipient of the Fulbright Fellowship, the Marie Curie Outgoing International Fellowship, the DTRA Young Investigator Award, and the NSF CAREER Award.