Hamilton Institute

Self Organization of Interfering 802.11 Wireless Access Networks

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Tuesday, November 1st, 2005

Abstract

The increased popularity of IEEE 802.11 WLANs has led to dense deployments in urban areas. Such high density leads to sub-optimal performance unless the interfering networks learn how to optimally share the spectrum. This paper proposes a set of novel fully distributed algorithms that allow (i) multiple interfering 802.11 WLANs to select their operating frequency in a way that minimizes global interference, and (ii) clients to choose their Access Point so that the bandwidth of all interfering networks is shared optimally. The proposed algorithms rely on Gibbs' sampler and optimize global network performance based on local information. They do not require explicit coordination among the wireless devices. We establish the mathematical properties of the proposed algorithms and study their performance using analytical, eventdriven simulations. Our results strongly motivate the need for self-organization strategies in wireless access networks. We discuss implementation requirements and show that significant benefits can be gained even within incremental deployments and in the presence of non-cooperating wireless clients.

Biography

Dina Papagiannaki received her first degree in electrical and computer engineering from the National Technical University of Athens, Greece, in 1998, and her PhD degree from the University College London, U.K., in 2003. Her PhD thesis on provisioning of IP backbone networks based on measurements received the CPHC/BCS Distinguished Dissertation award 2003 for the best PhD thesis in the area of Computer Science in the British Isles. She was a member of the IP research group at the Sprint Advanced Technology Laboratories between 2000 and 2003, where she studied network design and planning mechanisms for large scale IP networks, as well as techniques for the effective forecasting of backbone network traffic. She joined Intel research in Cambridge, U.K., in January 2004. Her research interests are in Internet measurements (wired and wireless), modeling of Internet traffic, network traffic engineering, and wireless mesh networking. More information at http://www.cambridge.intel.research.net/~kpapagia/.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 1.00 - 2.00pm (followed by tea/coffee)

Travel directions are available at www.hamilton.ie

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