Illinois Center for Wireless Systems

ICWS Seminar Series

Channel Assignment in Multi-Radio Wireless Mesh Networks: Algorithms and Practical Approaches

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B02 Coordinated Science Laboratory

To meet the increasing bandwidth demand of applications, the research community is interested in using multiple channels in wireless mesh networks to utilize the entire available spectrum. Use of multiple radio interfaces on each mesh router is a popular mechanism to enable use of multiple channels on the router without the need for fast channel switching ability and tight synchronization. This makes possible use of commodity 802.11 radios in a multichannel environment. We consider the problem of assigning channels to radio interfaces or network links in a multi-radio setup with the goal to maximize the network capacity. There are several ways to pose this problem; unfortunately they are computationally intractable. We will specifically detail one of these directions and present our recent results, where we develop heuristic algorithms that we empirically demonstrate perform close to a bound on the optimal.

In the second part of the talk, we will consider practicalities of such approaches in the context of commodity platforms. A model of interference is input to the channel assignment problem. This model somehow must be determined. We will present an empirically-based, measurement-driven approach to determine such a model for a deployed 802.11-based mesh network. This model can predict the capacity of any network link in presence of interference from other network nodes. As an aside, we will also discuss additional benefits of such an interference modeling approach, e.g., in determining the network capacity and taking admission control decisions.

Samir R. Das is currently an Associate Professor in the Computer Science Department in Stony Brook University. He received his Ph.D. in Computer Science from Georgia Institute of Technology, Atlanta, in 1994. His research interests include wireless networking, performance evaluation and parallel discrete event simulation. He has about seventy refereed research articles on these topics.

Samir Das has received the NSF CAREER award in 1998. He has been a speaker in the Distinguished Visitor program of the IEEE Computer Society during 2001-03. He co-chaired the program committees for the ACM MobiHoc Symposium in 2001 and ACM MobiCom Conference in 2004. He also co-chaired the 2nd IEEE WiMesh Workshop in 2006. He serves on the editorial boards of the IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, ACM/Kluwer Wireless Networks Journal and Ad Hoc Networks journal. He has served on the program committees of prominent conferences and workshops related to mobile and wireless networking and parallel/distributed simulation, such as MobiCom, MobiHoc, SECON, ICDCS, PADS and MASCOTS.