Keynote Talk

Multihop Wireless Networks: Capacity Limits and How to Approach Them

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Abstract

Wireless technology advances over the last few years lead to sophisticated physical layer designs that may interact with the access and network layer in multiple modes. Link quality related information is passed from the physical layer, to be used in access and network layer actions. At the same time several considerations belonging naturally to the physical layer, like channel coding rate, signal constellation selection, power level adjustments, frequency selection and beam steering in multiple antenna systems are to the disposal of the access layer, that may control them in various time scales. That interaction is particularly useful for full exploitation of the volatile error-prone mobile channel and the establishment of reliable broadband wireless links in the interference limited radio medium. It is clear that novel approaches are needed for architecting networks that seamlessly integrate wired and wireless components and offer the grade of service people are accustomed from the internet. In this presentation we will review a number of theoretical advances towards characterizing the capacity of wireless networks and present an optimization based framework for developing algorithms towards achieving that capacity. The necessary interaction among the different network layers will be discussed while implementation challenges both in terms of computational complexity as well as state information availability will be presented. Implications on the scaling properties of those algorithms will be given.

Categories & Subject Descriptors: C.2.1 Network Architecture and Design, C4 Performance of Systems

General Terms: Algorithms, Performance, Design.

Bio

The speaker is Professor in the Dept. of Computer and Telecommunications Eng., University of Thessaly, since 2002. He held positions as Assistant Professor at Polytechnic University New York (1991-95), Assistant and Associate Professor University of Maryland College Park (1995-2001) and Professor University of Ioannina Greece (1999-2001). His research interests are in the field of computer and communication networks with emphasis on fundamental mathematical models, architectures and protocols of wireless systems, sensor networks, high-speed internet and satellite communications. He holds a Diploma in Electrical Engineering from the Aristotle University of Thessaloniki, Greece in 1987, and the M.S. and Ph.D. degrees from the University of Maryland, College Park in 1989 and 1991 respectively. Dr. Tassiulas is a Fellow of IEEE. He received a National Science Foundation (NSF) Research Initiation Award in 1992, an NSF CAREER Award in 1995 an Office of Naval Research, Young Investigator Award in 1997 and a Bodosaki Foundation award in 1999. He also received the INFOCOM 1994 best paper award and the INFOCOM 2007 achievement award. His website is http://inf-server.inf.uth.gr/~leandros/.