

Wireless Network Coding: Network Coded Modulation in the Network Aware PHY Layer

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Tutorial

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The tutorial addresses strategies and principles of PHY layer coding and signal processing fully respecting and utilizing knowledge of the network structure. This technique substantially increases the overall network throughput, efficiency and reliability. Wireless Network Coding (WNC) is a general framework for PHY layer coding and processing strategies in which PHY behavior at a given node depends on its position in the network topology, and the signal-level processing/decoding uses multiple paths between source and destination. The decoding and relaying strategies utilize their knowledge of the contents and structure of the complementary side-information (“friendly interference”) available at various nodes. The tutorial will address the fundamental principles of WNC put into a context of network information theory with a comprehensive classification of the strategies. A section on advanced design and techniques will cover particular coding and processing designs and their respective properties. We will also address selected hot research topics and open problems

Biographies:

Jan Sykora received the M.Sc. and Ph.D. degrees in Electrical Engineering from Czech

Technical University in Prague, Czech Republic, in 1987 and 1993, respectively. Since 1991, he has been with the Faculty of Electrical Engineering, Czech Technical University in Prague, where he is now a Professor of Radio Engineering. His research includes work on wireless communication and information theory, cooperative and distributed modulation, wireless network coding and distributed signal processing, MIMO systems, nonlinear space–time modulation and coding, and iterative processing. He has served on various IEEE conferences as a Technical Program and Organizing Committee member and chair. He has led a number of industrial and research projects financed by EU and national agencies.

Alister Burr, BSc (Soton), PhD (Bristol), MIET, MIEEE, CEng) is Professor of Communications at the University of York, U.K. He has many years research experience in wireless networks, especially adaptive modulation and coding techniques, and also in evaluating overall network capacity, including realistic propagation modelling. He is currently Chair WG1, on Radio Systems, of COST Action 2100 “Pervasive Mobile and Ambient Wireless Networks”, and Associate Editor of IEEE Communications Letters.

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