Fundamental Performance Trade-offs in Coexisting Wireless Networks: Multi-Objective Optimization Approach

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Abstract: This presentation explores coexisting wireless networks sharing radio resources with contradicting performance objectives, such a system is amongst the main scenarios for the 5G communication systems. A multi-objective optimization framework is proposed to investigate the fundamental trade-off between the performances of the coexisting networks. For a given set of radio resources, the optimal achievable performances of the coexisting networks are characterized by a multi-dimensional Pareto set. If the performance objectives of some of coexisting networks are modified or adjusted, the proposed framework provides the maximum corresponding achievable variation to the performance of the rest of coexisting networks. The quantitative information provided by the proposed framework facilitates joint design and optimization of coexisting networks and can be further exploited for regulating the collaborations among coexisting networks. Examples are presented to show that the corresponding Pareto set can be in fact engineered by adjusting the technologies adopted in each of these networks.

Biography: Keivan Navaie (SMIEEE) received his Ph.D. in 2004. From March to November 2004, he was with the School of Mathematics and Statistics, Carleton University, Ottawa, Canada, as a Postdoctoral Research Fellow working on stochastic modelling of wireless networks. From December 2004 to September 2006, he was with the Broadband Communication and Wireless System (BCWS) Centre, Carleton University, Ottawa, Canada where he was the project manager of BCWS participation in European Union 6th Framework integrated project, the Wireless World Initiative New Radio (WINNER) on beyond 3G wireless systems. From September 2006 to July 2011 he was with the Department of Electrical and Computer Engineering, Tarbiat Modares University, Tehran, Iran. From July 2011 to November 2014 he has been with the School of Electrical and Computer Engineering, University of Leeds, Leeds, UK. He is currently an Associate Professor in the school of Computing and communications, University of Lancaster also a visiting research scientist in Telefonica Research and Innovation, Barcelona. His research interests lie in the field of radio resource allocation for wireless communication systems, dynamic spectrum allocation, cognitive radio networks, cooperative communications and stochastic network modelling. He has published more than 100 papers in peer reviewed journal and conference proceedings. Dr. Navaie is on the editorial board of the European Transactions on Telecommunications. He has also served as (co)Chair of Wireless Network Track, IEEE VTC-2012 Yokohama, Japan and IEEE 8th International Workshop on Wireless Network Measurements WinMee 2012, Paderborn, Germany, IEEE VTC2014-Spring, Seoul, South Korea, and IEEE WCNC 2014, Istanbul, Turkey. He is the recipient of the 2011 IEEE Iran Section Young Investigator award. His paper, “Access strategies for spectrum sharing in fading environment: Overlay, underlay and mixed,” was in the IEEE Communication Society Best readings on Cognitive Radio 2012. Dr. Navaie is Senior Member of the IEEE, and a Chartered Engineer in the UK.