

Title: Cooperative Transmission & Resource Allocation Techniques for Next-Generation Wireless Access Communications

Abstract: The co-existence of a large number of communications systems sharing the same resources and the proven advantages of multi-input multi-output (MIMO) transmission have recently led to the consideration of potential applications of the collaboration concept in heterogeneous broadband access communications networks for performance and capacity enhancement. Interference mitigation can be more efficiently done by coordination of the transmission and resource allocation between users to minimize mutual interference in a collaborative manner. Rather than competing for resources, in collaborative communications, users cooperate to assist each other in transmission and resource sharing in order to obtain broader coverage and to mitigate channel impairments without the need to use large transmitted power and hence to achieve substantial gain in system throughput and better resource utility. Next-generation broadband access communication networks are expected to include some form of cooperation between network nodes. Dynamic spectrum access through cognitive radios has also been recently considered for more efficient use of scarce spectrum resources. It will be beneficial to explore the cross-fertilization of cooperation and cognition, which will become especially important in heterogeneous wireless networks.

The talk will provide an overview of new developments/deployments in next-generation wireless access communications, and highlight technical issues in dynamic resource allocation and intelligent multi-dimensional signal processing and the evolution from competition, to cooperation and cognition in communications, and along with our current research activities and recent results in our broadband access communications laboratory at McGill University (Montréal, Québec, Canada).

Bio:



Tho Le-Ngoc obtained his B.Eng. (with Distinction) in Electrical Engineering in 1976, his M.Eng. in Microprocessor Applications in 1978 from McGill University, Montreal, and his Ph.D. in Digital Communications 1983 from the University of Ottawa, Canada.

During 1977-1982, he was with Spar Aerospace Limited as a Design Engineer and then a Senior Design Engineer, involved in the development and design of the microprocessor-based controller of Canadarm (of the Space Shuttle), and SCPC/FM, SCPC/PSK, TDMA satellite communications systems.

During 1982-1985, he was an Engineering Manager of the Radio Group in the Department of Development Engineering of SRTelecom Inc., developed the new point-to-multipoint DA-TDMA/TDM Subscriber Radio System SR500. He was the System Architect of this first digital point-to-multipoint wireless TDMA system.

During 1985-2000, he was a Professor in the Department of Electrical and Computer Engineering of Concordia University.

Since 2000, he has been a Professor in the Department of Electrical and Computer Engineering of McGill University.

His research interest is in the area of broadband access communications.

Since 2004, he has been Scientific Director of the Center for Advanced Systems and Technologies in Communications (SYTACom), including 5 universities in Quebec.

He is a Senior Member of the Ordre des Ingénieur du Quebec, a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), a Fellow of the Engineering Institute of Canada (EIC), a Fellow of the Canadian Academy of Engineering (CAE), and a Fellow of the Royal Society of Canada (RSC).

He is the recipient of the 2004 Canadian Award in Telecommunications Research, the recipient of the IEEE Canada Fessenden Award 2005, and a recipient of the 2013 Queen Elizabeth II Diamond Jubilee Medal.

He holds a Canada Research Chair (Tier I) on *Broadband Access Communications*, and a Bell Canada/NSERC Industrial Research Chair on *Performance & Resource Management in Broadband xDSL Access Networks*.

He is currently theme leader and/or project leader in three interdisciplinary NSERC Strategic Research Networks: Healthcare Support through Information Technology Enhancement (hSITE), NSERC Smart Microgrid Network (NSMG-Net), and Smart Applications on Virtual Infrastructure (SAVI).

Since 1985, he has been a consultant, Technical Advisor, Chief Architect, Chief Scientist to several companies in communications.