BCWS Seminar Series

On the Impact of Channel State Information on Cognitive Radio System Capacity

by

Prof. Pawel Dmochowski
Victoria University of Wellington, New Zealand

Time: Wednesday, December 15, 12:00 - 1:00 pm
Place: Room ME 4439, Mackenzie Building, Carleton University

Abstract: The inefficiency of spectrum utilization under the current fixed assignment model has been widely documented, resulting in a wave of research activity in the area of Cognitive Radio. The basic notion of cognitive radio is opportunistic access to spectral resources by a secondary (cognitive) user (SU). One of the key considerations is adequate protection of the primary (licensed) user (PU), which can be accomplished by allowing the SU to transmit only in temporarily vacant spectrum, or simultaneously with the PU, provided the PU performance degradation is kept below an acceptable level. The latter, referred to as the underlay approach, can be achieved by mandating a maximum interference level at the primary receiver. Recently, a signal-to-interference and noise ratio (SINR) constraint has been considered as an alternative to the interference-based approach, offering the flexibility resulting from PU channel strength variations. The price of this approach, however, is the requirement of channel knowledge at the SU transmitter, as well as the possibility of SU blocking in the event of poor PU SNR. This talk will focus on the performance of a cognitive radio system operating under an SINR constraint assuming various channel knowledge scenarios. We will demonstrate the impact of the incomplete channel knowledge on the SU capacity and on the probability of SU blocking. Furthermore, we will investigate the use of PU and SU transmit antenna selection with the aim of boosting the performance of the SU as well as reducing the interference caused to the primary user.

Biography: Pawel Dmochowski received a BASc in Engineering Physics from the University of British Columbia, and MSc and PhD degrees from Queen's University at Kingston in 2001 and 2006, respectively. From 2007 to 2008 he was a Natural Sciences and Engineering Research Council (NSERC) Visiting Fellow at the Communications Research Centre Canada, working with the Terrestrial Wireless Systems Research Group. In 2008 he was also a Sessional Instructor at Carleton University in Ottawa. He is currently a Lecturer with the School of Engineering and Computer Science at Victoria University of Wellington, New Zealand. His general research activities are in the area of wireless communications and signal processing, with recent interests in timing synchronization in multiple antenna system as well as performance analysis of cognitive radio systems. Dr. Dmochowski is a Member of the IEEE and the IEEE Communication Society.