UNIVERSITY
OF TRENTO - Italy
Information Engineering
and Computer Science Department

SEMINAR ANNOUNCEMENT:

Multiple-Access Satellite Random Access Communications with PHY-Layer Joint Detection

Speaker: Christian Schlegel, Dalhousie University of Halifax (CAN)

Date: ***Tuesday 17 July 2018***
Time: ***10.00 a.m.***
Room: GARDA ("Fabio Ferrari" Building, Via Sommarive 5, floor +1)

Abstract:
With the recent increase in interest in satellite Internet delivery systems; there is renewed pressure to improve the capacity of random-access uplink communications, especially by small-aperture or mobile earth terminals with bursty packet traffic. While the ALOHA random protocols are the standard, both original and slotted ALOHA have relatively small maximum throughput due to packet collisions. These issues have been addressed with new concepts, such as "contention-resolution diversity slotted ALOHA" (CRDSA)" and "irregular repetition diversity slotted ALOHA" (IRDSA). In these methods packets are transmitted multiple times allowing an iterative packet-based cancelation algorithm to achieve theoretical throughputs close to the single-user channel capacity. However, both transmit powers and decoding delays are substantially increased in CRDSA and IRDSA. Our approach is to resolve packet collisions at the PHY layer using a joint decoder, which can resolve collision via iterative signal cancelation. We will present the design of the coding and modulation system used to enable the cancelation process and present detailed simulation results that illustrate the achievable spectral efficiencies. The method works for completely asynchronous access and incurs no significant extra decoding delay. Implementation strategies and nuances will also be discussed.

About the speaker:

Christian Schlegel (Fellow, IEEE) held the iCORE Chair for Digital Communications at the University of Alberta, Edmonton, AB, Canada, from 2002 to 2012. Prior to that, he held academic appointments at the University of Hawaii at Manoa (visiting), Honolulu, HI, USA, at the University of South Australia, Adelaide, SA, Australia, at the University of Texas at San Antonio, San Antonio, TX, USA, and from 1996 to 2002 at the University of Utah, Salt Lake City, UT, USA. From 2004 to 2008, he also served as a Chief Technology Officer (part-time) of Aquantia Corporation, Milpitas, CA, USA, a start-up company building 10 Gbit/s Ethernet transceivers. He is the author of *Trellis Coding* (IEEE Press, 1997), *Trellis and Turbo Coding* (Wiley, 2004, 2015), as well as *Coordinated Multiple User Communications* (Springer, 2006). He is currently an NSERC Industrial Research Chair at Dalhousie University, Halifax, NS, Canada. His research interests include reliable digital communications for complex transmission environments. He was an Associate Editor for coding theory and techniques of the IEEE TRANSACTIONS ON COMMUNICATIONS from 1999 to 2007, a Guest Editor for the PROCEEDINGS OF THE IEEE, and currently serves on the Editorial Board of Hindawi Publishing. He received a U.S. National Science Foundation Career Award in 1997 and a Canada Research Chair in 2001. He served as a Technical Program Chair of the IEEE Information Theory Workshop 2001, the IEEE International Symposium on Information Theory 2005, the Symposium on Information Theory and its Applications 2016, and as the General Chair of the 2005 IEEE Communication Theory Workshop and the 2013 IEEE Conference on Wireless On-Demand Network Systems and Services. He was named the IEEE Distinguished Lecturer in 2007 and 2011.

Contact person for this seminar: **CLAUDIO SACCHI**, claudio.sacchi@unitn.it