Embedding Communication Systems in Power Lines

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Talk summary

Power lines offer a medium where to embed smart systems for data communications. This talk covers recent advances in Power Line Communication (PLC) which is a technology that exploits the power distribution network for information delivery. Applications of PLC are ubiquitous: from home/industrial/vehicular networking and automation to communications for the smart grid. However, the power line channel is a hostile medium that poses several challenges. Its characterization and modeling is a fundamental step to allow the development of reliable communication systems. In this talk, methodologies and enlightening results about the channel characterization will be described. Such results have allowed the development of novel statistical channel modeling and hardware emulation tools. Similarities and differences with the wireless channel behavior will also be discussed. To cope with such a channel, advanced physical layer and signal processing techniques have to be realized. In this respect, novel filter bank modulation solutions (which in the form of OFDM have been adopted by both narrow band and broad band PLC standards) combined with coding and smart resource allocation algorithms can grant robust performance and coexistence with other technologies. In particular, some key aspects of filtered multitone modulation based architectures will be described to show that such architectures are suitable for application in PLC and they enjoy and efficient digital implementation in hardware.

Biography

Andrea M. Tonello received the doctor of engineering degree in electronics (1996) and the doctor of research degree in electronics and telecommunications (2003), both from the University of Padova, Italy.
On February 1997, he joined as a member of technical staff, Bell Labs – Lucent Technologies, where he worked on the development of baseband algorithms for cellular handsets, first in Holmdel, NJ, and then within the Philips/Lucent Consumer Products Division in Piscataway, NJ. From September 1997 to December 2002, he has been with the Bell Labs Advanced Wireless Technology Laboratory, Whippany, NJ. He was promoted in 2002 to technical manager, and was appointed managing director of Bell Labs, Italy. He conducted research on wireless systems, on air interface design and performance analysis. He was involved in the standardization of the evolution of 2G and 3G cellular technology.
In January 2003, he joined the Dipartimento di Ingegneria Elettrica, Gestionale e Meccanica (DIEGM) of the University of Udine, Italy, where he is an aggregate professor and founder of the Wireless and Power Line Communication Lab. In 2014 he received the full professor habilitation. He is also the founder and president of WiTiKee, a university spin-off company.
His research focuses on next generation wireless systems, infomobility and vehicular networks, power line communications including in-home and smart grids. Dr. Tonello received several awards among which the Lucent Bell Labs Recognition of Excellence award (2003), the Distinguished Visiting Fellowship from the Royal Academy of Engineering, UK (2010), and the Distinguished Lecturer Award by the IEEE Vehicular Technology Society (2011-2012 and 2013-15). He is the co-recipient of five best paper awards.
He held chairing positions at conferences and in particular he was the General Chair of IEEE ISPLC 2011 and he is the general co-chair of IEEE SmartGridComm 2014 to be held in Venice, Italy.
He serves/ed as an associate editor for the IEEE Transactions on Vehicular Technology (2007-13), the IEEE Transaction on Communications (2012-TD), IEEE Access (2013-TD). He is the chair elected for the term 2014-16 of the IEEE Communications Society Technical Committee on Power Line Communications.

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