

ADAPTIVE POWERLINE COMMUNICATION SYSTEMS

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In this talk we evaluate the potential of adaptive broadband power line communications (PLC) transmission over the classical in-house powerline wires. In PLC systems an orthogonal frequency division multiplexing (OFDM) has been adopted as physical access scheme to cope with the multipath channel reflections at the receiver end. However, for coherent detection in OFDM the accurate channel estimates are required. Currently, the channel estimation (CE) schemes based on time division multiplex (TDM) and frequency division multiplex (FDM) pilots are foreseen, where the channel delay-time domain windowing is used for noise reduction (de-noising) based on the pre-defined guard interval length. We evaluate the impact of house appliances on duration of channel delay spread as well as channel behavior in the frequency domain. We also present and evaluate a mechanism for efficient CE with adaptive de-noising algorithm designed based on mean square error criteria. The method is designed to reduce the noise in the system which is exploited by channel equalizer to improve the system's performance. The adaptive algorithm is used as a driver for the transceiver with adaptive guard interval based on the channel conditions. The algorithm performance is evaluated by computer simulation to illustrate efficiency of the adaptive PLC system.

Haris Gacanin was born in Sarajevo, Bosnia and Herzegovina, where he received his Dipl.-Ing. degree in Electrical engineering from the Faculty of Electrical Engineering, University of Sarajevo in 2000. He received his M.E.E. and Ph.D.E.E. from Graduate School of Electrical Engineering, Tohoku University, Japan, in 2005 and 2008, respectively. Since April 2008 until May 2010 he has been working first as Japan Society for Promotion of Science (JSPS) postdoctoral research fellow and then as an Assistant Professor at Graduate School of Engineering, Tohoku University. Currently, he is with Alcatel-Lucent Bell N.V. in Antwerp, Belgium and the Communication Group at Energy and Communication Department, IPSA Institute, Sarajevo, Bosnia and Herzegovina. His research interest is in the fields of wireline and wireless communications with focus on: home networking technology and architectures, management and diagnostics of home and access networks, xDSL transmission technology, wireless network coding, channel estimation and equalization, cognitive radio, MIMO,

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