

# Performance Evaluation of Coded UWB-IR on Multipath Fading Channels

Michał M. Pietrzyk and Jos H. Weber

Faculty of Electrical Engineering, Mathematics and Computer Science  
Delft University of Technology  
Mekelweg 4, P.O. Box 5031, 2600 GA Delft, The Netherlands  
Telephone: +31 15 27 81609, Fax: + 31 15 27 81774  
Email: M.M.Pietrzyk@ieee.org, J.H.Weber@ewi.tudelft.nl

**Abstract**—In most research on error correction coding for UWB techniques, the channel is assumed to be Gaussian, whereas the multipath case is neglected. In this paper, we evaluate the performance of a realistic and feasible UWB-IR system in a severe multipath environment. We model the nonlinearities introduced by UWB antennas, by using their real characteristics obtained through the measurements. We present a general coding-modulation scheme for UWB communications and focus on two particular cases, namely, one using superorthogonal convolutional coding, and the other based on simple UWB frame repetition. Our theoretical results, confirmed by simulations, show that superorthogonal convolutional coding provides a more effective way of protection against errors than simple frame repetition.

**Index Terms**—Ultra-wideband, channel coding, frame repetition, multipath.