Abstract

Multiband Orthogonal Frequency Division Multiplexing (MB-OFDM) approach using UWB signals with short duration of pulses provide unique advantages in short-range high data rate wireless applications which include easy penetration through obstacles, high precision ranging and low processing power. In this paper a performance study on MB-OFDM is attempted for high data rate ultra wideband (UWB) WPAN physical layer standard according to modulation techniques such as QPSK, 16-QAM, 64-QAM etc. Different multipath components in the UWB channels are characterized by different delays and attenuation. The channel models chosen in simulation of MB-OFDM UWB communication system are different from standard UWB channels considering realistic multipath resolution and operating frequencies. In this research different amplitude fading statistics for UWB channel (IEEE 802.15.3a) are analysed. The BER performance of MB-OFDM UWB on modified UWB channel models are investigated through simulation study. It is observed that QPSK modulation for the MB-OFDM UWB system performs better than 16-QAM and 64-QAM in the CM3 (NLOS) and CM4 (NLOS) channel environment. We show that, at low data rate (55 Mbps) the MB-OFDM system performs better in the CM4 channel environment than in the CM3, CM2 and
CM1 channel model due to its inherent frequency diversity. In high data rate (480 Mbps), the BER performance in CM1 channel model is found to be better than in CM2, CM3, CM4 channel model.

Reference

- X. Li and L. J. Cimini, “Effects of clipping and filtering on the performance of OFDM,”
- Seyed Mohamad Sajad Sadough, Asad Mahmood, Emmanuel Jaffrot and Pierre Duhamel” Performance Evaluation of IEEE 802.15.3a Physical Layer Proposal Based on Multiband-OFDM” http://www.lss.supelec.fr/~publi/U2V5ZWQtTW9oYW1tYWQtU2FqYWQgU0FET1VHSA==_799FullPath%20paper%20IST%202005_sadough.pdf.

Index Terms

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Key words

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UWB

IEEE 802.15.3a

QPSK

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64-QAM

Bit Error Rate
Efficacy of Multiband OFDM Approach in High Data Rate Ultra WideBand WPAN Physical Layer Standard using Realistic Channel Models