Abstract

Recent studies suggest that multicarrier systems using wavelets outperform conventional OFDM systems using the FFT, in that they have well-contained side lobes, improved spectral efficiency and BER performance, and they do not require a cyclic prefix. Here we study the wavelet packet and discrete wavelet transforms, comparing the BER performance of wavelet transform-based multicarrier systems and Fourier based OFDM systems, for multipath Rayleigh channels with AWGN. In the proposed system zero-forcing channel estimation in the frequency domain has been used. Results confirm that discrete wavelet-based systems using Daubechies wavelets outperform both wavelet packet transform-based systems and FFT-OFDM systems in terms of BER. Finally, Alamouti coding and maximal ratio combining schemes were employed in MIMO environments, where results show that the effects of multipath fading were greatly reduced by the antenna diversity.
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- E. Telatar, &quot;Capacity of Multiple antenna Gaussian Channels,&quot; European transactions on telecommunications, vol. 10, no. 6, pp. 585-595, 1999.
- Z. Hong, et al., &quot;Spatial multiplexing in correlated fading via the virtual channel representation,&quot; IEEE Journal on Selected Areas in Communications, vol. 21, no. 5, pp. 856-866, 2003.
- H. J. Taha, M. F. M. Salleh, &quot;Performance analysis of QAM modulation parameters on wavelet packet transform (WPT) and FFT-OFDM system,&quot; IEEE 9th Malaysia International Conference on Communications (MICC), pp. 1 – 5, 2009.

- U. Khan, S. Baig and M. J. Mughal, &quot;Performance Comparison of Wavelet Packet Modulation and OFDM over Multipath Wireless Channel with Narrowband Interference,&quot; International Journal of Electrical Engineering and Computer Sciences,
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IJECS, Spet. 2009 vol. 9, no. 9, pp. 431-434.


- W. Sweldens, "The Lifting Scheme: A New Philosophy in Biorthogonal Wavelet Constructions;" Wavelet Applications in Signal and Image Processing III, vol. 2569, pp. 68 – 79

Index Terms

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Keywords
OFDM BER Multipath Discrete Wavelet Transform (DWT) Wavelet Packet Transform (WPT) Multiple Input Multiple Output (MIMO).