

# **Abstract**

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## **Channel Estimation Using Multi-Rate Barker Codes for Wavelet-OFDM Based Systems**

In this paper channel estimation is achieved through the use of two novel algorithms incorporating the various advantages of Barker codes. Comparisons between the delay estimation percentage error of the Least Linear Minimum Mean Square Error (LMMSE) conventional channel estimation technique with the two newly proposed techniques takes place. The first proposed algorithm embeds a Barker code to the transmitted wavelet orthogonal frequency division multiplexing (WOFDM) data block and uses the correlation between that Barker code and the received signal in order to accurately estimate the channel delay at the receiving end. The second suggested algorithm uses multi-rate Barker codes to generate a WOFDM training sequence. The difference in peak positions of the auto correlation of the transmitted and received sequences is used to estimate the delay introduced by the channel. These comparisons are performed with four different wavelet filters which are used in the WOFDM modulation. The simulation and results show case the advantages of using each of the new techniques versus the conventional LMMSE method.