

# Abstract

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## **A novel coding scheme for QAM using variational Bayesian inference**

Variational Bayesian inference is one of the most powerful tools that can be used in estimation of random variations. Traditionally, in digital modulation, random noise is modeled as an additive white Gaussian noise (AWGN). In this paper, a novel coding scheme is introduced by which the effect of AWGN is decreased and the bit error rate (BER) versus the signal to noise ratio (SNR) curves are enhanced for quadrature amplitude modulation (QAM) schemes such as 16, 64 and 256 QAM. This satisfies the growing need of high data rates with minimum receiving error. The proposed scheme depends on using the variational Bayesian expectation maximization (VBEM) algorithm and mapping of weights. It is performed on the symbol level not on the bit level. The paper shows comparisons between the proposed VBEM coding algorithm and the Viterbi algorithm. The proposed algorithm has better BER performance as well as extra coding gain when compared to the Viterbi algorithm with same code rates.