

# **On The Accuracy Of Gaussian Approximations In The Error Analysis Of DS-CDMA With OQPSK Modulation**

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## **Summary**

This paper considers the bit error probability analysis of direct-sequence code-division multiple access with offset quadrature phase-shift keying (OQPSK) modulation and random signature sequences. A statistical characterization of the decision variable at the output of the correlation receiver is obtained, and several techniques for evaluating the error performance, previously derived for binary phase-shift keying (BPSK)-modulated systems, are then extended to the case of OQPSK. This includes exact bit error evaluation, as well as various approximation methods based on Gaussian modeling of the multiple-access interference terms. These techniques, known as the standard and improved Gaussian approximations, have increasing complexity depending on the level of accuracy required. For BPSK, the standard approximation is typically found to be inaccurate, unless the number of users becomes large, and only the improved approximation yields sufficient accuracy in general. But for the case of OQPSK, the relative performance comparison developed in this paper shows that, for all practical purposes, the simple standard approximation is surprisingly very accurate even with a small number of users.

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