Ergodic Capacity and Symbol Error Rate Analysis of a Wireless System with α-μ Composite Fading Channel

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Research Article

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Abstract

A composite α-μ/Lognormal fading channel is proposed with several channel performance criteria. This model considers the most effective occurrences in a fading channel, mainly non-linearity, multi-cluster nature of propagation medium, and shadowing effects. The new generation of communication systems is moving towards the use of millimetre waves (mmW). In this type of propagation, large-scale effects of fading channel on the received signal are significant, so in the proposed composite model, the lognormal distribution is considered to model large-scale effects of fading, which is the most accurate distribution to model shadowing. The Gaussian-Hermite quadrature sum is used to approximate the probability distribution function (PDF) of the proposed model. After calculating the statistics, the symbol error rate (SER) and ergodic capacity are computed. The Mellin transform technique is used to calculate the SER expression of different modulation schemes; then, ergodic capacity is computed for a diverse frequency spectrum. Finally, the Monte Carlo method is used to evaluate the analyses.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the latest manuscript can be downloaded and accessed as a PDF.

Figures

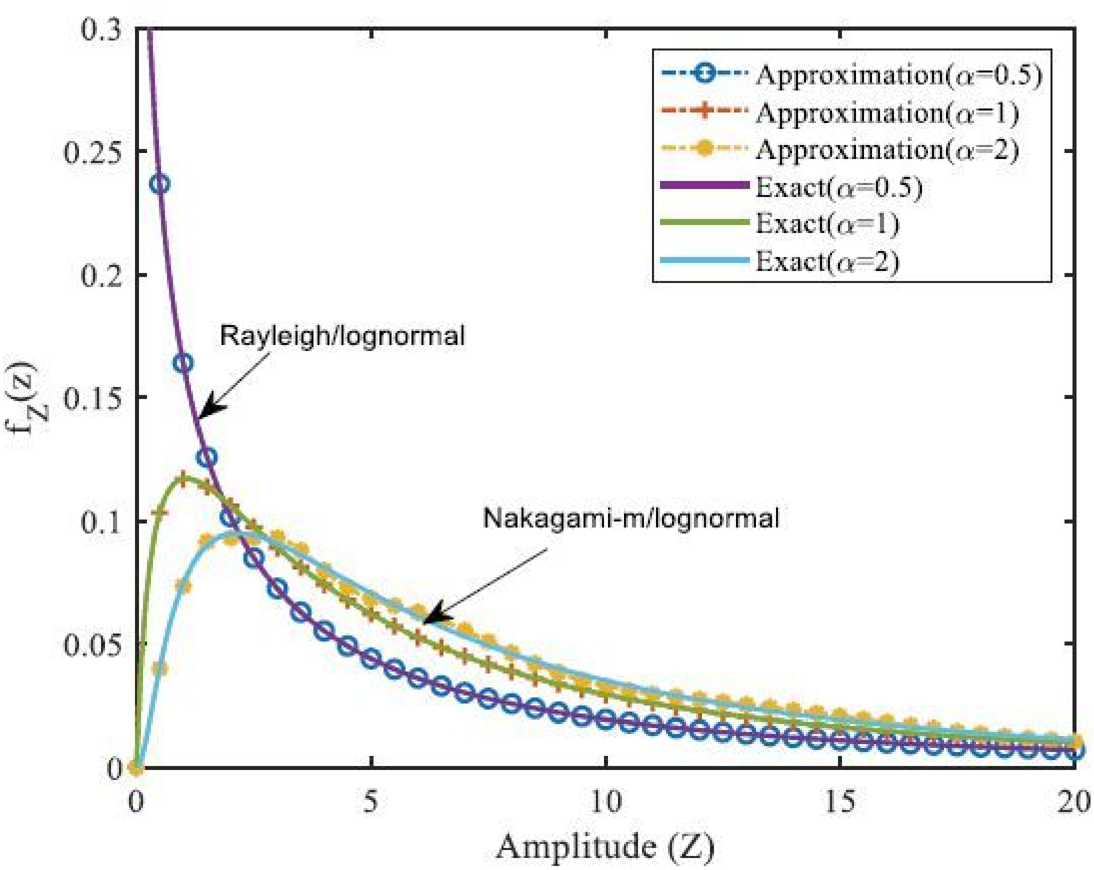

Figure 1

Composite fading PDF for various α values, and μ = 2, σ = 1, and 2 v m = .The approximation graph is obtained by relation (13), and the Exact one obtained based on (9)

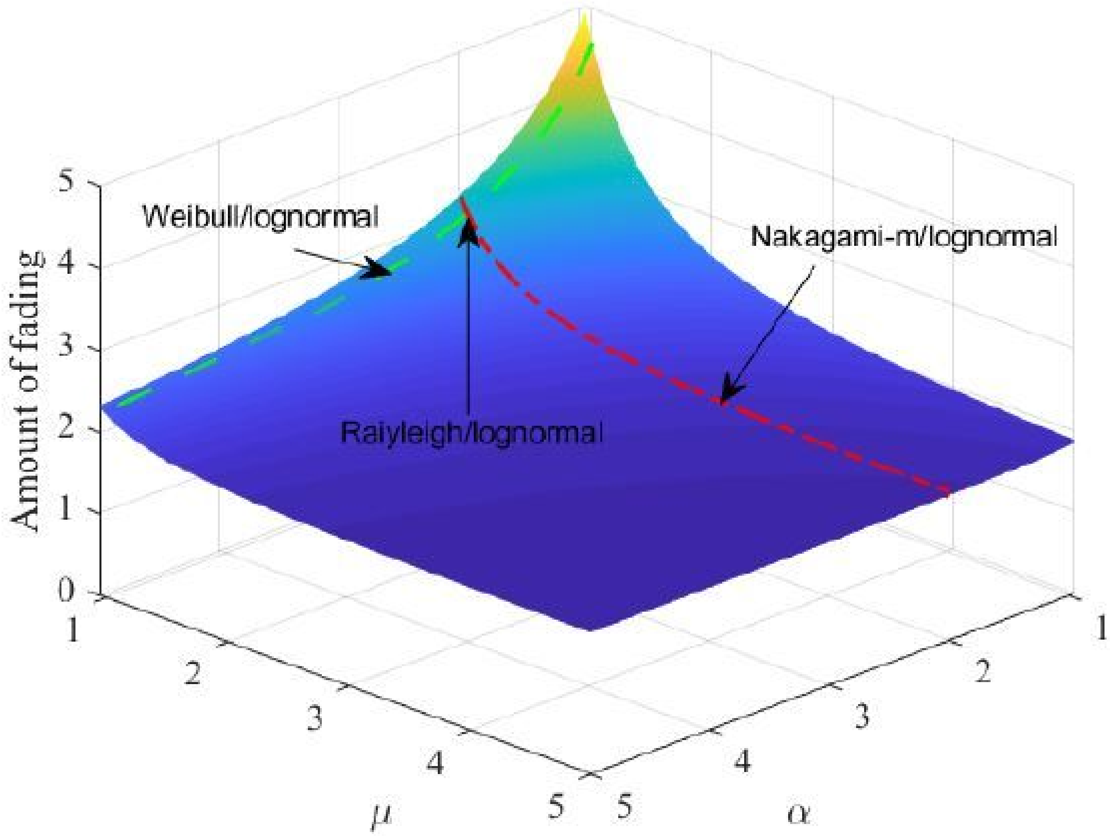

Figure 2

Amount of fading for the various α and μ values and m - 3

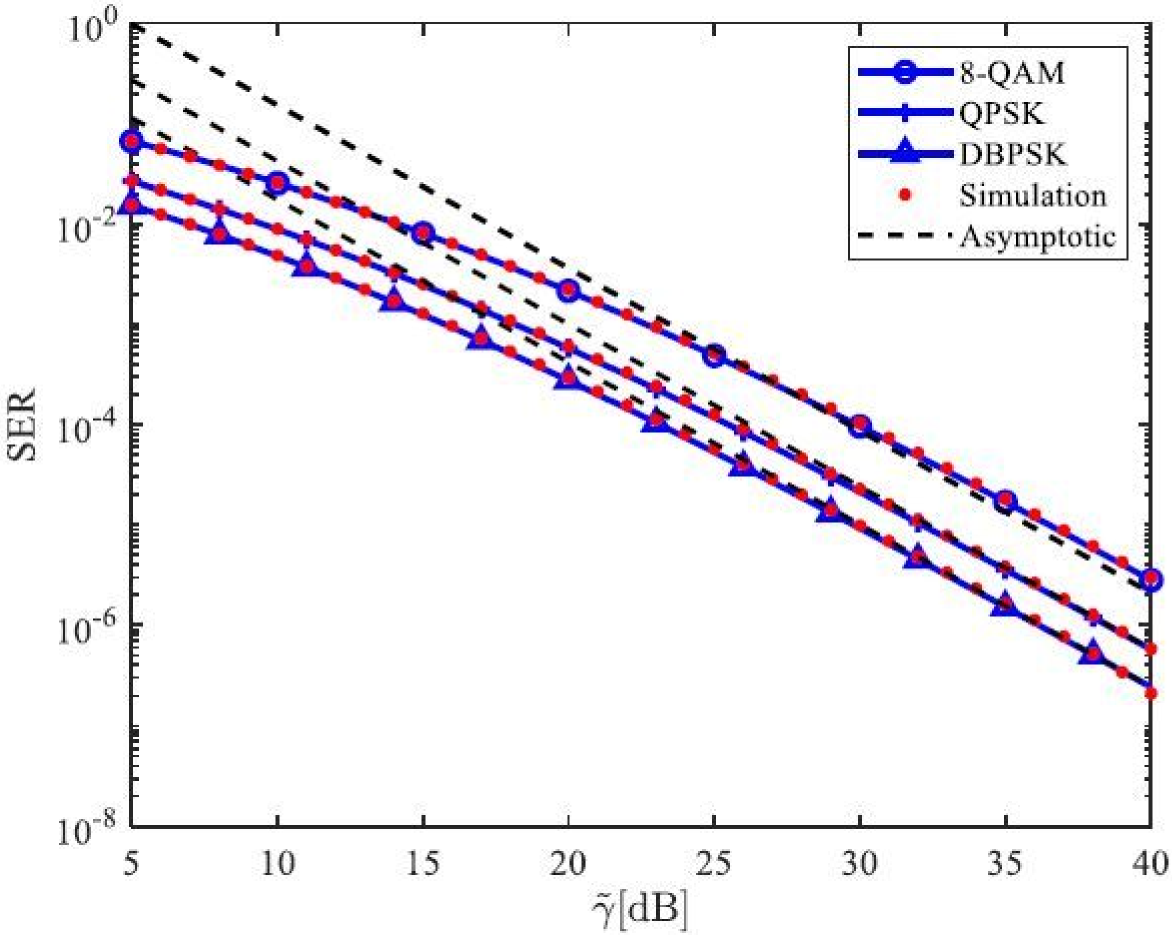

Figure 3

SER for QPSK, 8-QAM, and DBPSK modulations considering α=3.6 and μ=0.9 over α-μ/lognormal fading. The dotted line represented the result of Monte Carlo simulations, and dashed lines represent asymptotic graphs.

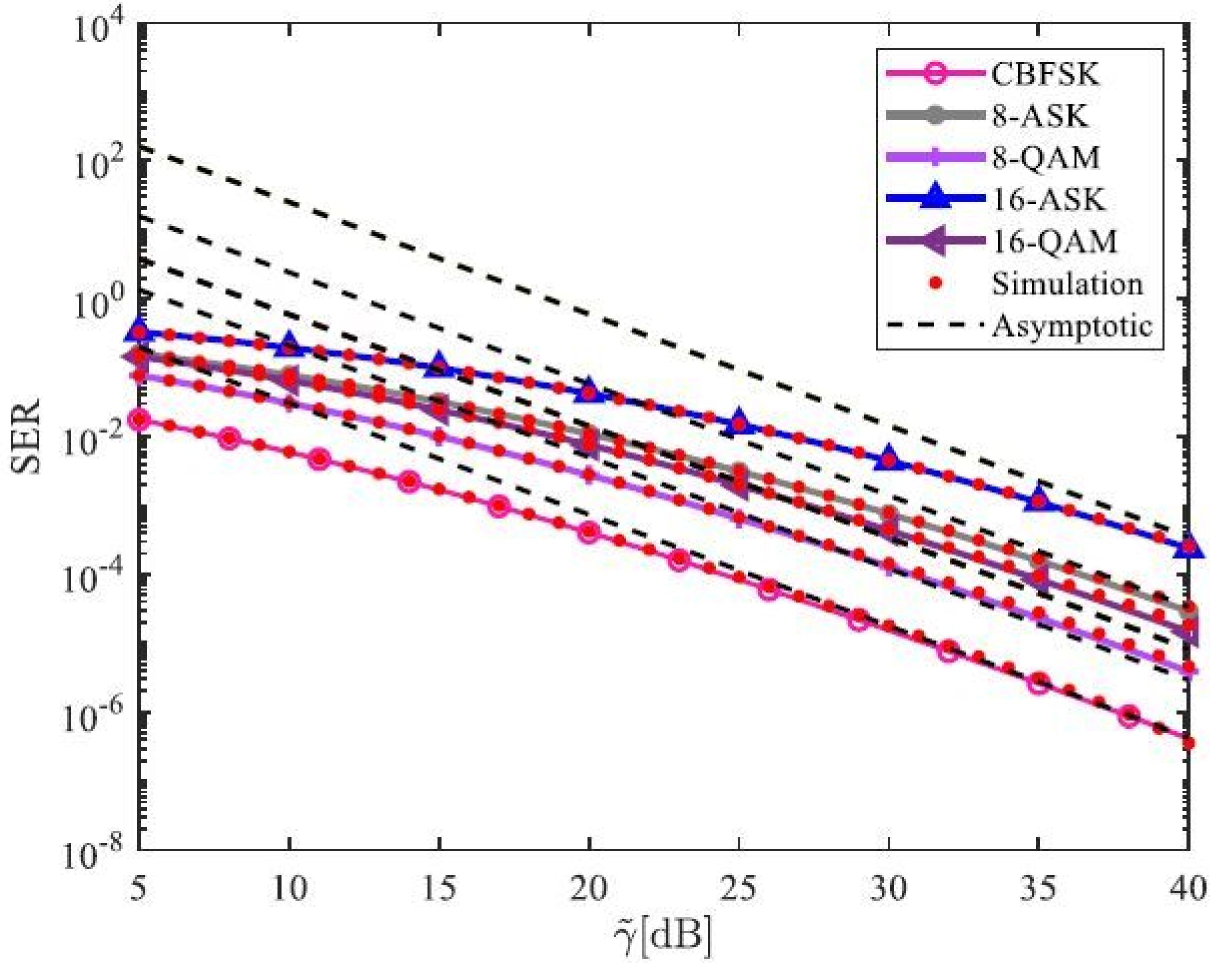

Figure 4

SER for CBFSk, 8-ASK, and 8-QAM, as well as 16-ASK and 16-QAM modulations considering α=3.6 and μ=0.9 over α-μ /lognormal fading. The dotted line represented the result of Monte Carlo simulations, and dashed lines represent asymptotic graphs.

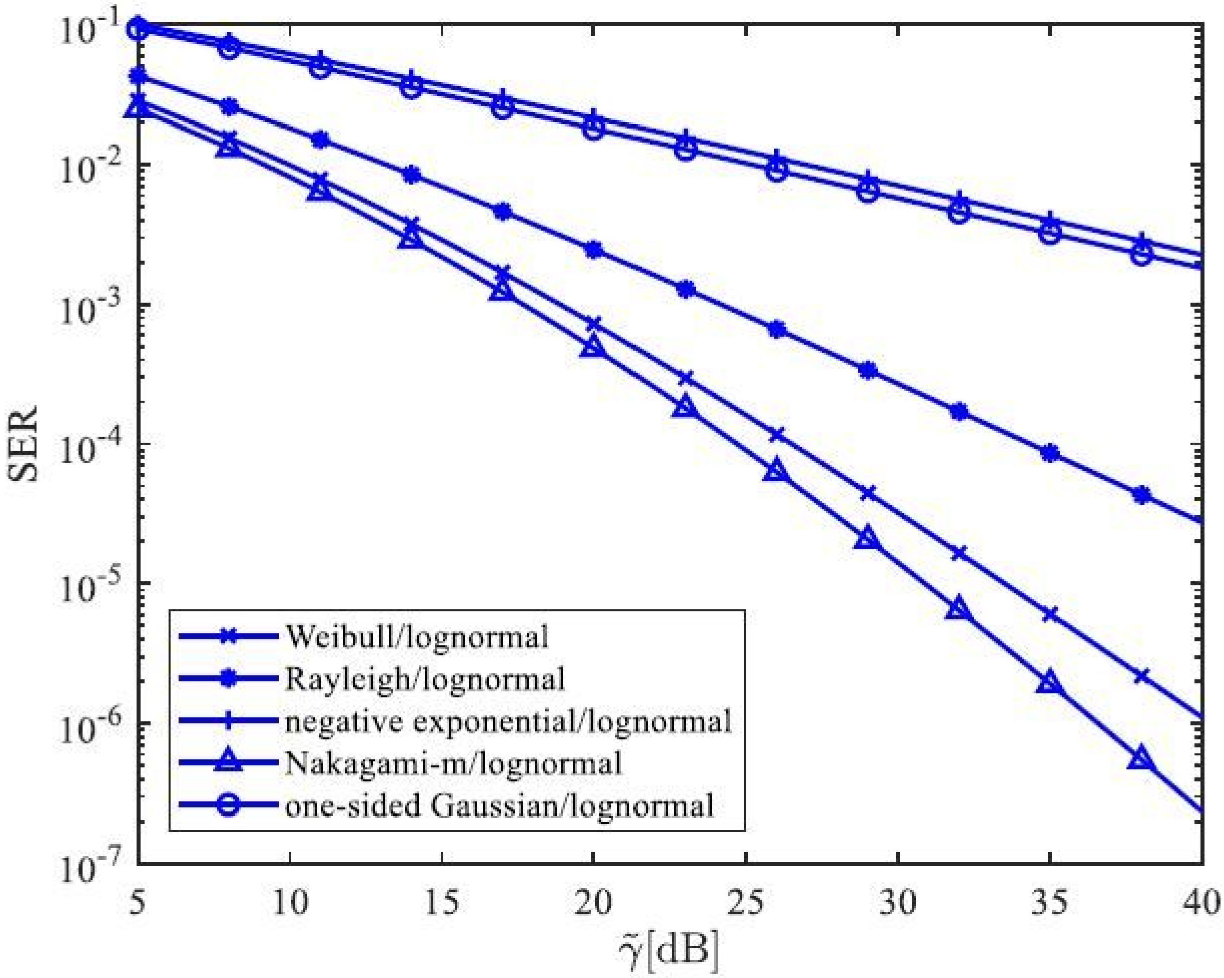

Figure 5

SER for QPSK modulations over different fading models obtained from the α-μ/lognormal .

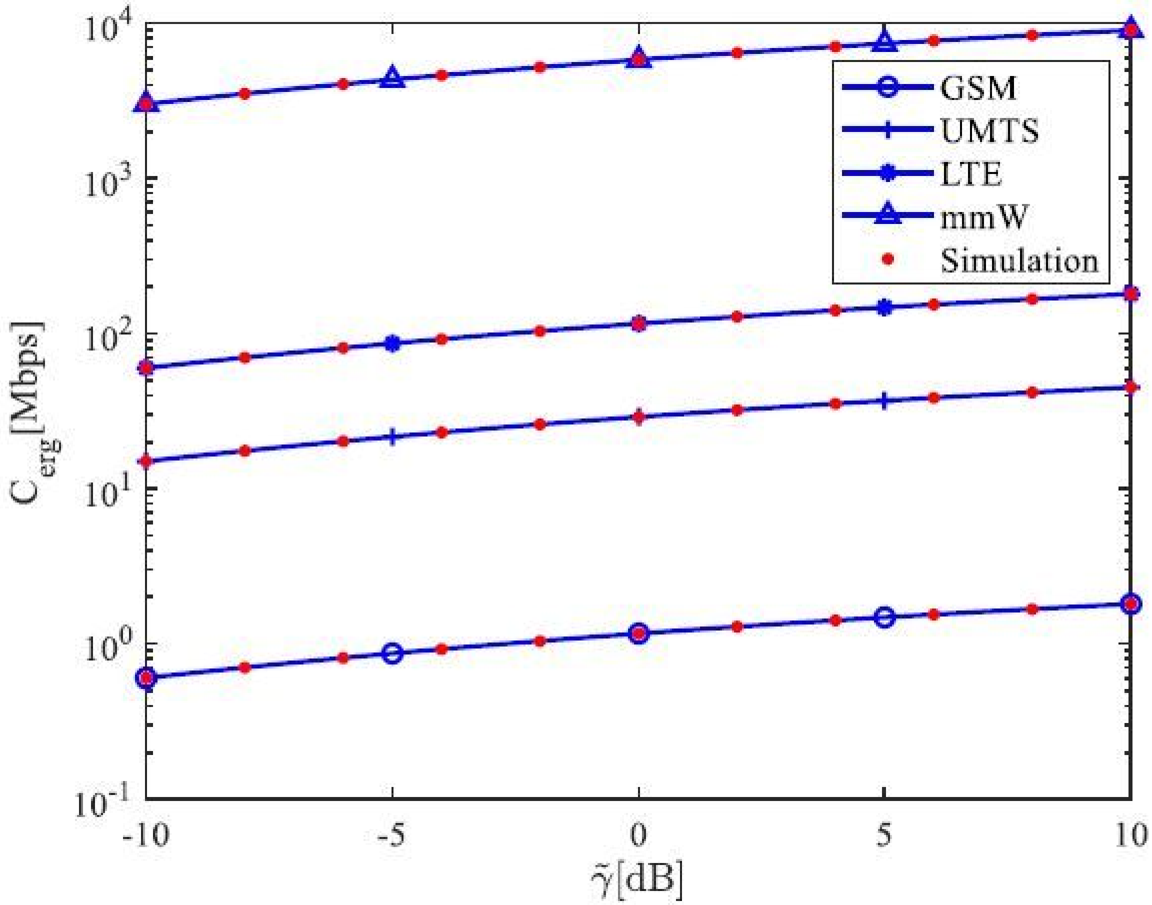

Figure 6

The ergodic capacity for different mobile communication systems considering α=3, μ=5, σ=1, and m=2 over α-μ/lognormal fading. The dotted line represented the result of Monte Carlo simulations.