Abstract:

Discrete multitone (DMT) signals are known to have large dynamic range, which make them prone to nonlinear effects such as the quantization effects inherent to the signal processing at the transmission chain. However, the analysis of these effects is difficult due to the noncontinuous nature of quantization characteristics. In this paper we present a simple and accurate analytical method for the performance evaluation of quantization effects on DMT signals. For this purpose, we take advantage of the Gaussian-like nature of DMT signals with a large number of subcarriers and define a smooth polynomial nonlinear characteristic that gives rise to signals with spectral characterization that is similar to quantization signals. This equivalent nonlinearity is then employed for obtaining the performance of quantized DMT signals when conventional receivers, ideal Bussgang receivers and optimal receivers are employed.1