Accepted Manuscript

Blind SNR estimation for M-ARY Frequency Shift Keying signal using Covariance technique

Sunil Devanahalli Krishnamurthy, Samrat L. Sabat

PII: S1434-8411(16)30468-X
DOI: http://dx.doi.org/10.1016/j.aeue.2016.07.012
Reference: AEUE 51662

To appear in: *International Journal of Electronics and Communications*

Received Date: 29 November 2015
Accepted Date: 30 July 2016

Please cite this article as: S.D. Krishnamurthy, S.L. Sabat, Blind SNR estimation for M-ARY Frequency Shift Keying signal using Covariance technique, *International Journal of Electronics and Communications* (2016), doi: http://dx.doi.org/10.1016/j.aeue.2016.07.012

Blind SNR estimation for M-ARY Frequency Shift Keying signal using Covariance technique

Sunil Devanahalli Krishnamurthy[1,*], Samrat L. Sabat[1]

Centre for Advanced Studies in Electronics Science and Technology, School of Physics, University of Hyderabad, Hyderabad, India, 500046

Abstract

This paper presents a blind SNR (Signal-to-Noise-Ratio) estimation algorithm for an M-ARY Frequency Shift Keying (MFSK) signal in Rayleigh and Rician fading channels with Additive White Gaussian Noise (AWGN). The SNR is estimated by comparing the test statistic of the received signal with a calibrated signal. The estimated SNR corresponds to the SNR that minimizes the difference between the computed and calibrated test statistics. The test statistic of both the received and calibrated signal is calculated using the Sample Covariance Matrix (SCM). The proposed algorithm performance is compared with the Partially Data Aided Maximum Likelihood Estimator (PDA MLE). The numerical results show that the Normalized Mean Square Error (NMSE) of the proposed algorithm is better than the PDA MLE. The NMSE is consistently less than 10^{-2} over the SNR range -20 dB to +20 dB using 512 samples. Further, the algorithm can detect the signal with a probability of detection 0.9 up to -8 dB SNR without any extra computation. However, the detection performance can be improved by increasing the number of samples. The proposed algorithm can be used for signal detection and SNR estimation for a broad range of SNR.

Keywords: Data Aided Estimator, Covariance matrix, Normalised Mean Square Error, Signal to noise ratio.

*Corresponding author

Email addresses: dksunil@uohyd.ac.in (Sunil Devanahalli Krishnamurthy), slssp@uohyd.ac.in,Tel:914023134326 (Samrat L. Sabat)