

MIMO Detectors: A Comprehensive Performance Analysis

Obi, E.¹, B. O. Sadiq², O. S. Zakariyya³ and A. Theresa⁴

^{1,4}Department of Electronics and Telecommunications Engineering, Ahmadu Bello University, Zaria; ²Department of Computer Engineering, Ahmadu Bello University, Zaria; ³Department of Electrical and Electronics Engineering, University of Ilorin, Ilorin, Kwara State, Nigeria.

Abstract

Multiple-input multiple-output (MIMO) systems are increasingly becoming popular due to their ability to multiply data rates without any expansion in the bandwidth. This is critical in this era of high-data rate applications but limited bandwidth. MIMO detectors play an important role in ensuring effective communication in such systems and as such the performance of the following are compared in this paper with respect to symbol error rate (SER) versus signal-to-noise ratio (SNR): maximum likelihood (ML), zero forcing (ZF), minimum mean square error (MMSE) and vertical Bell laboratories layered space time (VBLAST). Results showed that the ML has the best performance as it has the least Symbol Error Rate (SER) for all values of Signal to Noise Ratio (SNR) as it was 91.9% better than MMSE, 99.6% better than VBLAST and 99.8% better than ZF at 20db for a 2x2 antenna configuration., it can also be deduced that the performance increased with increase in number of antenna for all detectors except the V-BLAST detector.

Keywords: ML detectors, ZF detectors, MMSE detectors and V-BLAST detectors

Email: eobi@abu.edu.ng, bosadiq@abu.edu.ng, Zakariyya.os@unilorin.edu.ng

Received: 2018/05/28

Accepted: 2021/05/27

DOI: <https://dx.doi.org/10.4314/njtr.v16i3.4>