
Differential decorrelator: a new approach for designing CDMA linear detector

A.Y. Hassan* and A.M. Hassan

Benha University,
Benha Higher Institute of Technology (BHIT),
Benha, El-kalubia, Egypt
E-mail: ayahiahassan@gmail.com
E-mail: ayman.hassan@orange-ftgroup.com
*Corresponding author

A.F. Hussian

Faculty of Engineering,
Communication Dept.,
Cairo University, Giza, Egypt
E-mail: afayez@idsc.net.eg

Abstract: The systems that are designed based on CDMA are suffering from a multiple access interference problem. The decorrelator CDMA detector is a linear detector that can cancel the MAI but with channel noise enhancement. The complexity of the decorrelator is a linear function in the number of the system's users. In this research, a new detector is proposed that can cancel the MAI in the received CDMA signal with a complexity that is independent on the number of the system's users. The new detector does not need to know the users' signature codes. Also, it consists of two matched filter only. No correlation matrix is required. This simple structure reduces the complexity of the proposed CDMA detector if it is compared with the conventional decorrelator detector.

The new detector is based on some mathematical operations on the output signals from two different matched filters. The detector idea is based on the symmetry property of the signatures' codes correlation matrix however; it does not need to know this matrix. The algorithm is valid as long as the correlation matrix is symmetry. It can work with synchronous and asynchronous system models.

Keywords: code division multiple access; CDMA; multiple access interference; matched filter; MF; decorrelator detector; minimum mean square error detector; signature codes correlation matrix.

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Biographical notes: A.Y. Hassan received his BSc in Electrical and Electronics Engineering (with honours) from Benha Higher Institute of Technology, Benha, Egypt in 2000 and his MSc in Communications from Benha University, Benha, Egypt in 2004. He is currently pursuing his PhD at Cairo University. His current research interest includes detection and estimation, code division multiple access (CDMA) systems, multiuser detectors, fading channels and multiple access interference cancellation.

Ayman M. Hassan received his BSc in Industrial Electronics from Benha High Institute of Technology in 1993 and his MSc and PhD in Electronic Communications from Cairo University in 1998 and 2002, respectively. He worked as a Staff Member in Benha High Institute from 1994 until 2008. He also worked in many R&D centres as a part-time Consultant during the same period. His main research interests are CDMA cellular systems, wireless networks and power line carrier communications. He currently works for Orange Cairo ILAB as a Wireless and Broadband Expert.

Abdel-Wahab F. Hussien received his BSc and MSc in Electrical Communication Engineering from Cairo University, Cairo, Egypt. In 1969, he received his PhD from Virginia Polytechnic Institute Blacksburg, Virginia, USA. He is a Professor at the Faculty of Engineering, Electronics & Communications Dept., Cairo University since 1981. He has written several papers for technical international journals and conferences. His research interests include signal processing, detection and estimation, fading channel communication, modulation and cellular mobile radio systems.