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AN MMSE-BASED MCI AND MAI CANCELLATION RECEIVER
FOR MIMO OVFSF-OFCDMA SYSTEMS

By

Nuwan Kithsiri Kumara

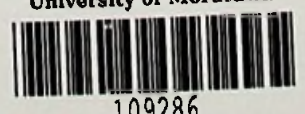
A DISSERTATION

Submitted to the Faculty of Engineering
of the University of Moratuwa
in partial fulfillment of the requirements for
the degree of Master of Science in Telecommunications

Moratuwa, Sri Lanka

April, 2012

University of Moratuwa



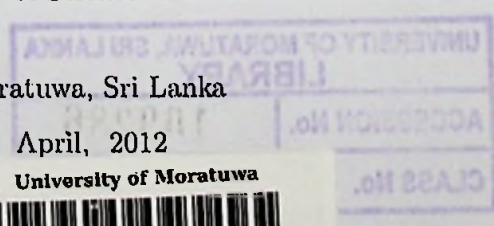
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UNIVERSITY OF MORATUWA

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MIMO OVFSF-OFCDMA SYSTEMS

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Declaration

This thesis to the best of my knowledge and belief, contains no material that has been accepted for the award of any other degree or recognized qualification by a university or institute of higher learning and it contains no material previously published or written by another person, except where due reference is made in the text of the thesis. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for inter-library loans, and for the title and summary to be made available to outside organizations.

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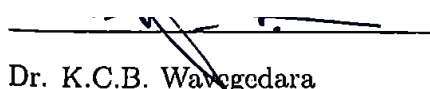
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Abstract

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(Master of Science in Telecommunications)

AN MMSE-BASED MCI AND ISSI CANCELLATION
RECEIVER FOR MIMO OVSF-OFCDMA
SYSTEMS

(April, 2012)

Abstract of a dissertation at the University of Moratuwa.
Dissertation supervised by Dr. K.C.B. Wavegedara

Broadband orthogonal frequency code division multiple access (OFCDMA) with two dimensional spreading is a promising candidate for Beyond fourth Generation (B4G) networks. Since wideband channels are highly frequency-selective, orthogonality among orthogonal spreading codes are no longer maintained. Therefore, multiple code interference (MCI) is inevitable in OFCDMA-based systems. Multiple-Input Multiple-Output (MIMO) will be a key technology of future wireless communication systems. In MIMO-OFCDMA systems, in addition to MCI, inter-spatial stream interference (ISSI) will also exist. Even though maximum a posteriori probability (MAP)-based detectors provide the best performance, their computational complexity is high. Alternatively, minimum mean-square error (MMSE) detectors can be used to obtain a better tradeoff between the complexity and the performance.

Several interference cancellation techniques were proposed under LTE Advanced, B4G standardizations and corresponding literature. One such technique is zero-forcing MAI nulling and cancellation based on QR decomposition (ZF-QRD). That can be used to cancel the MAI separately. But we are proposing a combined ISSI and MCI cancellation technique. We also compare the performance of MIMO VSF-OFCDMA recursive ISSI and MCI cancellation scheme with conventional MC-CDMA, MC-DS-CDMA, MT-CDMA and OFCDMA.

To my parents . . .

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