

بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ.

صدق الله العظيم

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DEDICATION

This work is dedicated to all, without their caring support it would not have been possible.

To all my family members for their continuous support.

Thank you for allowing me to stretch to my potential.

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ABSTRACT

Wireless networks have quickly become part of everyday life, MIMO and Space Time Coding techniques have generated much research interest in recent years.

An important class of space-time code is the Orthogonal Space-Time Block Code (O-STBC), which achieves good performance and ability to provide full transmit diversity for mitigating slow fading by requiring multiple antennas only at the base stations or access points. However O-STBC suffers from low code rate when used with more than 2 transmit antennas and complex modulation.

In this thesis present Quasi-Orthogonal STBC (QO-STBC), focuses on the design and analysis of full-diversity QO-STBC with very low decoding complexity and high code rate.

In this study the performance of Quasi Orthogonal Space Time Block Codes (QOSTBC) with 16QAM and rotated QPSK has been analyzed and compared over the proposed method using the beamforming technique, and analysis of the bit error rate (BER) performance of QOSTBC.

This design technique is implemented with two cases of 1, and 4 transmit antennas and 1, and 4 receive antennas.

The simulations show that the Quasi Orthogonal STBC design can enhance the performance and results for QOSTBC with the proposed beamforming scheme shows better performance over the 16QAM and rotated QPSK modulation.

المستخلص

الشبكات اللاسلكية أصبحت سريعاً جزء من الحياة اليومية ، وقد ولدت تقنيات تعدد المدخلات وتعدد المخرجات وكتلة شفرة الزمن على الفراغ الكثير من الاهتمام في السنوات الأخيرة.

من فئات كتلة شفرة الزمن على الفراغ الهامة فئة كتل شفرة الزمن على الفراغ المتعامد الذي يحقق الاداء الجيد والقدرة على توفير الارسال الكامل لتحقيق التلاشي عن طريق تقاطعات هوائيات متعددة الا في المحطات او نقاط الوصول ، ولكن كتل شفرة الزمن على الفراغ المتعامد يعاني من معدل ترميز منخفض عند استخدامه مع اكثرب من اثنين من هوائيات الارسال والتعديل المعد.

في هذه الاطروحة نقدم كتلة شفرة الزمن على الفراغ شبة المتعامد الذي يركز على تصميم وتحليل التنوع الكامل مع فك تشفير منخفض التعقيد ورمز معدل مرتفع لاكثر من اثنين من هوائيات الارسال ، في هذه الدراسة أداء كتلة شفرة الزمن على الفراغ شبه المتعامد مع استداره الـ QAM 16 و QPSK ، تم تحليلها ومقارنتها على الطريقة المقترحة باستخدام تقنية تكوين الشعاع. ويتم تنفيذ هذه التقنية مع حالتين 1 و 4 هوائيات للارسال ، او 4 هوائيات للاستقبال ولقد حصلنا على نتائج المحاكاة متوافقة مع ما هو متوقع من استخدام تقنية كتلة شفرة الزمن على الفراغ شبه المتعامد و تظهر المحاكاة ان تصميم كتل شفرة الزمن شبة المتعامد يمكن ان يحسن الاداء ، ونتائج كتلة شفرة الزمن على الفراغ شبه المتعامد مع مخطط تكوين الشعاع المقترح تظهر اداء افضل خلال QAM 16 واستداره الـ QPSK .

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List of Abbreviation

Abbreviation	Full Name
AWGN	Additive white Gaussian noise
BER	Bit Error Rate
CSI	Channel State Information
dB	Decibel
EVCM	Equivalent Virtual Channel Matrix
ISI	Inter Symbol Interference
LOS	Line Of Side
MIMO	Multiple-Input Multiple-Output
MISO	Multiple Input/Single Output
MRC	Maximum Ratio Combining
ML	Maximum Likelihood
NLOS	No Line of Sight
OSTBC	Orthogonal Space-Time Block Codes
PEB	Pairwise Error Probability
QOSTBC	Quasi Orthogonal Space Time Block Code
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift King
SISO	Single Input Single Output
SIMO	Single Input Multiple Output
STC	Space-time coding
STTC	Space-Time Trellis Codes
STBC	Space Time Block code
SNR	

SER

Signal to Noise Ratio

Symbol Error Rate