بسم الله الرحمن الرحيم

وَمِنَ النَّاسِ وَالدَّوَابِّ وَالْأَنْعَامِ مُخْتَلِفٌ أَلْوَانُهُ كَذَلِكَ إِنَّمَا يَخْشَى اللَّهَ

مِنْ عِبَادِهِ الْعُلَمَاء إِنَّ اللَّهَ عَزِيزٌ غَفُورٌ

صدق الله العظيم

(28)فاطر

DEDICATION

Dedication to our mothers

Dedication to our fathers

With love and respects

Dedication to our friends

Whom we cherish their friendship

Dedication to our special people

Who mean so much to us …

Dedication to all our teachers….

In whom we believe so much ……

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ABSTRACT

New developed cellulartechnologies or mobile communication systems usually are aimed to improve the services quality that provided to the target user. The improvement can be verified in terms of a good signal-to –interference ratio (SINR) which increases the system capacity among other performance metrics.

Interference occurs when two or more signals overlaps with each other, it consider a problem in terms of the system performance which arises in transmission quality and the system capacity.

This research studies the interference problem in LTE Advanced, as one of the challenges facing 4G systems. Smart antenna system is used as mitigation technique for this problem,in which the adaptive beam-forming algorithms cancel the interference signals by increasing the gain in a chosen direction. Therefore, it would improve the system performance. The smart antenna performance investigated by MATLAB program to simulate its operation as well as the performance improvement of service offered to the end user .

The improvement of the system performance considers the achieved result of this research. It evaluated the smart antenna performance metrics in term of SINR which improved by 150%, capacity increased by 31.5%,data rate by 128.8%, throughput by 155.8% and spectral efficiency by 129%.

المستخلص

التقنيات او انظمه الاتصالات الجديده في العاده تهدف لتحسين جوده الخدمه التي تقدم للمستخدم. التحسين يمكن ان يكون جليا على صعيد عدد من عوامل الاداء منهم زياده نسبه الاشاره المطلوبه الى اشاره التداخل بالاضافه لاشاره الضجيج و ايضا زياده في سعه النظام.

التداخل يحدث عند صدور اشارتين او اكثر من مصدر واحد او عند تقارب الاشارات في قيمه التردد المستخدم, حيث يؤدي اليالتاثير في ادائيه النظام من حيث جوده الارسال وقدره النظام الوظيفيه.

يتناول هذا البحث ظاهرهالتداخلفيتطور طويل المدى المحسنكأحدانظمهالاتصالات الجديده في الجيلالرابع . استخدمت تقنيه الهوائيات الذكيه لتقليل ظاهره التداخل , حيث تتحكم في اتجاه نمط انتشار هوائياتها بالخوارزمياتالملائمه مما يؤدي اليتحسينادائيهالنظام.

تم التحقيق من تحسن الاداء للنظام عن طريق لغه الماتلاب في شكل نتائج محاكاه, و التي اعتبترت كنتائج لهذا البحث. ايضا تم تقييم زياده في ادائيه النظام علي صعيد الزياده في نسبه زياده الاشاره المطلوبه الي اشاره التداخل و الضجيج التي تحدث من قناه الاتصال نفسها تقدر بحوالي 150%, الزياده في قدره النظام تتمثل في زياده عدد المستخدمين للنظام في منطقه معينه او في زياده البيانات المرسله خلال قناه الاتصال بمقدار31.5%, زياده معدل ارسال البيانات اي عدد البيانات في الثانيه الواحده بنسبه128.8%,زياده جمله الخرج للنظام تبعا لزياده البيانات بنسبه155% و ايضا الزياده في مدى استقلاليه طيف الاتصال في النظام بمقدار 129%.

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LIST OF SYMBOLS

Symbol	Meaning
E(k)	Error
(k)	Reference signal
Y(k)	Output signal
h	Gain of the signal
w	Weight
H	Transpose of the Matrix or Vector.
S(t)	The signal
W(t)	The Signal Weight
N(t)	The Noise Signal
I(t)	The Interference Signal

Abbreviation

Abbreviation	Full Name
SNR	Signal-to-Noise Ratio
SINR	Signal-to-Interference and Noise Ratio
LTE	Long-Term Evolution
DOA	Direction Of Arrival
LMS	least Mean Square
3GPP	Third Generation Partnership Project
CDMA	Code Division Multiplexing Access
WCDMA	Wideband Code Division Multiplexing Access
GSM	Global System for Mobile Communications
IMT	International Mobile Telecommunication
4G	Fourth Generation
3G	Third Generation
ITU-R	International TelecommunicationsUnion Radio communication
FDMA	Frequency Division Multiplexing Access
TDMA	Time Division Multiplexing Access
OFDMA	Orthogonal Frequency Division Multiplexing Access
MIMO	Multi-Input Multi-Output
SOI	Signal Of Interest
SNOIs	Signal Not Of Interest
DSP	Digital Signal Processing
SDMA	Spatial Division Multiple Accesses
AMC	Adaptive Modulation and Coding
TDD	Time Division Duplex

FDD	Frequency Division Duplex
LOS	Line-of-Sight
CCI	Co-Channel Interference
FB	Fixed Beam-forming
MMDS	Multichannel Multipoint Distribution Service
BWA	Broadband Wireless Access
SB	Switched Beam-forming
SDMA	Space Division Multiple Access
AB	Adaptive Beam-forming
TD	Transmit Diversity
RF	Radio Frequency
IF	Intermediate Frequency
MUD	Multi-User Detection

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