Sudan University of Science and Technology

College of Graduate Studies

Interference management for Device to Device communication Underlying Cellular Networks Using DRC And FFR

A Research Submitted In Partial fulfillment for the Requirements of the Degree of M.Sc. degree in Electronics Engineering (Communication)

إدارة تداخل الإتصال من جهاز الى جهاز المحددة للشبكات الخلوية بإستخدام إعادة التردد وتحديد المسافة المعيارية

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APRIL 2017

قال تعالى:

﴿يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ﴾

صدق الله العظيم

سورة المجادلة

الآية{11}

Dedication

This dedication To our parents and families, who love and

Support us.

To all the teachers at Sudan University who taught us throughout our college career.

To all our friends and colleagues.

Acknowledgments

In the first and before all we thankALLAH for every things we are reaching and going to it in our life.As always, the completion of any project would not be possible without the support.

I would especially like to thank Dr. Rashid Saeed for his steadfast support during the preparation of this project who has done a great job managing in the project and keeping on track.

also grateful to thank Eng. Mustafa Malek Adam ALhag ,who gave me a lot of information during preparing the project.

Last, but not least we would like to thank all teachers at the Sudan University and especially teachers of Faculty of Engineering and Department of Electronic

Abstract

D2D communication aims to improve the spectral efficiency and increases the overall system capacity. In the proposed scheme, sharing the uplink channel of a cellular system is analyzed in single cell and multi cell.

In single cell, the model investigated how to properly choose a CUE for the D2D link, by using Distance constrained Resource sharing Criteria (DRC) for the base station to select the best resource ofa CUE to reuse it for a D2D link.

L_{min} is a pre-selected distance constraint to control the interference from the selected CUE to the D2D UE1 to be interference in the stable level $L \geq L_{min,}$ (L_{min}=150.437),to adjusted the power transmitted from CUE ,using OFPC, Open loop power control is capability of the UE transmitter to set its uplink transmit power to a specified value suitable for receiver.

In multi cell, used fractional frequency reuse in D2D Communication,assumed cluster consist of three cell, studied the distance of location for D2D pair from the center of the cell edge of inner region,to cell edge of total cell with out FFR.

Assumed the D2D pair in inner region in first cell the D2D pair faces interference from inner region from other cells which it has same frequency. Calculated the distance from tow center and from D2D pair, and calculate the SINR

The simulation results show that the proposed scheme can enhance the value of SINR and optimal system capacity on the promise of ensuring the cellular communication quality.

المستخلص

هذه الاطروحه تقدم جزء معينا من تقنيات الجيل الرابع وهو نظام الاتصالات المباشرة (من جهاز الى جهاز) من غير تدخل اساسي للابراج الهوائيه.ويتم دمج هذا النظام مع الاتصالات الخليوية.

نظام الاتصالات المباشرة يزيد من مساحه التغطية وزياده السعة لكل المستخدمين كما انه يساعد على الاستغلال الامثل للطيف المرئي وذلك باعاده استخدام القناة.

اعاده استخدام القناه يتم تنفيذه باستخدام نفس القنوات ضمن المنطقه المسماه بالخلايا والمحدده بالمواقع المختلفه في منطقه خدمه الشبكه الخليويه، هذا البحث لا يخصص قنوات معينه لنظام الاتصال المباشر، وانما نقوم باعادة استخدام قنوات اللاتصالات الخليوية وذلك لزياده كفاءة النظام.

في هذا البحث نناقش كيفيه التقليل من التداخل بين مستخدمي نظام الاتصال المباشر ومستخدمي نظام الاتصال الخليوي .

للاستغلال الامثل للنطاق الترددي في الخليه الواحده ؛يتم اعاده قناه النظام الخليوي وذلك بحساب المسافة المثلى بين مستخدم النظام الخليوي ومستخدم النظام المباشر لكي لايحدث التداخل ولقد وجدت في هذا النموذج المقترح تقريبا150.437 كذلك تم التحكم في كميةالقدرة الواصلة للمستقبل بمعادله معينة وحساب SINR،أما في عدة خلايا فقد تم تقسيم النطاق الترددي في الثلات خلايا وتم تقسيم النطاق الترددي للخلية الواحدة لقسمين الجزء الخارجي للخليه والجزء الداخلي لها؛كذلك افترض أن النطاق الترددي نفسه للجزء الداخلي للثلاث خلايا مخصص لنظام الاتصال المباشروبذلك يقل التداخل بدرجة عالية وتم حساب SINR والسعه وذلك لضمان جودة وكفاءة النظام.

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LIST OF ABBREVIATIONS

AWGN	Additive White Gaussian Noise
BS	Base Station
BF	Beam forming
BSR	Buffer Status Report
CUE	Cellular user equipment
C2D	Cellular to Device
CN	Core Network
CQI	Channel Quality Indicator
D2D	Device to Device
DUE	Device user equipment
D_R	Device to Device receiver
D_T	Device to Device transmitter
DM-RS	Demodulation Reference symbols
DL	Down link
DPF	Direct Provisioning Function
D2C	Device to Cellular
eNBs	Evolved Node B
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
EPC	Evolved Packet Core
FFR	Fractional Frequency Reuse
5G	The Fifth Generation of Mobile TelecommunicationsTechnology
3GPP	The 3rd Generation Partnership Project
HSS	Home Subscriber Server
IC	Interference Cancelation
LTE	Long Term Evaluation
LTE-A	Long Term Evaluation - Advanced
LA	Location Area
MATLAB	Mathematical Laboratory
MME	Mobility Management Entity
MS	Mobile Station
MAC	Media Access Interval
NEW	Network entity
OFDM	Orthogonal Frequency Division Multiplexing
PLMN	Public land mobile network
Prose	Proximity service
PDLCCH	Physical Down link Control Channel
PUSCCH	Physical Uplink Share Channel

PDF	Probability Density Function
PPP	Poisson point process
QOS	Quality Of Service
RB	Resource Block
RSRP	Reference Symbol Received Power
SINR	Signal to noise plus interference ratio
SR	scheduling request
SRS	Sounding Reference Signal
TTI	Transmission time interval
UE	User equipment
UMTS	Universal Mobile Telecommunication System
UL	Uplink