بِسْمِ اللهِ الْرَّحْمَنِ الْرَّحِيمِ

قال تعالى

﴿ ۞ نَرْفَعُ دَرَجَاتٍ مّن نّشَآءُ وَفَوْقَ كُلّ ذِي عِلْمٍ عَلِيم ۞ ﴾

صدق الله العظيم

سورة يوسف الآية { 76 }

Dedication

To My Parents,

My Family,

My siblings,

And My Friends

Acknowledgement

First, I would like to thank Allah, the Merciful, for giving me the power and health to do this work.

I would like to express my sincere gratitude to my supervisor Dr. Mohammed Hussein for his keen supervision unlimited help and invaluable guidance.

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Lastly, grateful acknowledgement is made to all those who participated with their time, effort, advise and knowledge to make this a successful study.

Abstract

Relaying is one of the features being proposed for the 4 G LTE advanced systems. The aim of LTE relaying is to enhance both coverage and capacity.

Relaying is a potential solution to improve the coverage and capacity in LTE-Networks .relay deployment to support higher data rates and better coverage, especially at the cell edges which suffer from inter-cell interference. The solution of relaying is attractive because of its low cost and easy deployment. This project shows that deploying just one relays per sector can significantly improve system capacity and coverage. The geometric deployment of relays that maximizes the spectral efficiency of the worst users or minimize outage. For its study is compared several aspects like SINR or the throughput between a scenario with Relay and another without Relay having implemented a LTE-Networks.

المستخلص

الترحيل هي واحدة من الميزات التي يجري اقترحها فى الجيل الرابع لنظام التطور الطويل الامد المتطورة . والهدف من ترحيل التطور الطويل الامد هو تعزيز كل من التغطية والسعة.

الترحيل هو حل محتمل لتحسين التغطية والسعة في شبكات التطور الطويل الامد،نشر المرحل لدعم معدلات بيانات أعلى وتغطية أفضل، خاصة عند حواف الخلية التي تعاني من التداخل بين الخلايا.المرحلات من الحلول الجذابة جدا بسبب انخفاض تكلفته وسهولة تطبيقه واستخدامة. هذا المشروع، يبين أن نشر واحدة فقط من المرحلات في القطاع يمكن أن يحسن إلى حد كبير سعة النظام والتغطية. ونشرالهندسى الأمثل للمرحلات يزيد من كفاءة الطيف عن أسوأ المستخدمين والحد من الانقطاع. لدراست ومقارنة جوانب عدة مثل نسبة إشارة إلى التدخل بالإضافة إلى نسبة الضوضاء أو الإنتاجية بين سيناريو مع المرحل وآخر بدون المرحل بعد تنفيذ شبكات التطور طويل الامد.

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Abbreviations List

3GPP	3rd Generation Partner Project
4G	Fourth Generations
AF	Amplify-and-Forward
DF	Decode-and- Forward
dB	Decibel
dBm	Decibel-mili-Watt
DeNB	Donor evolved Node B
DL	Downlink
eNB	evolved Node B (base station)
FDD	Frequency Division Duplex
Hz	Hertz
IEEE	Institute of Electrical and Electronic Engineers
IMT	International Mobile Telecommunications
ISD	Inter-Site distance
ITU-R	International Telecommunication Union- Radio
LTE	Long-Term Evolution
LTE-A	Long-Term Evolution Advance
LOS	Line-Of-Sight
MBS	Macro base station
m	Meter
MS	Mobile Stations
MIMO	Multiple-Input Multiple-Output
NLOS	Non-Line-Of-Sight
MATLABS	MATrix LABoratory
M-hop	Multi-hop
OFDM	Orthogonal Frequency Division Multiplexing

OFDMA	Orthogonal Frequency Division Multiple Access
OPEX	Operational Expenditure
Prob	Probability
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service
RF	Radio Frequency
RN	Relay Node
RS	Relay stations
Sc1	Scenario 1
SNR	Signal to Noise Ratio
SINR	Signal to Interference plus Noise Ratio
TDD	Time Division Duplex
UE	User Equipment
UL	UP Link

Symbol List

BW	Bandwidth [Hz]
PL	Path loss [dB]
R	Distance between point-to-points [Km]
n_{LOS}	Path loss exponent (Line-Of-Sight)
G_{Tx}	Gain transmitter [dB]
G_{Rx}	Gain receiver [dB]
σ	Thermal noise level at the receiver [dBm]
$SINR$	Signal to Interference plus Noise Ratio [dB]
p_s^s	Power transmitted from the sth sector [dBm]
I_{tot}	Total interference [dB]
$h_u^{b,s}$	Total Path loss [dB]
η	Spectral efficiency [bps]
B_{eff}	Bandwidth efficiency