

الآية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى: (يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ

وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ)

صدق الله العظيم

سورة المجادلة

الآية 11

DEDICATION

This thesis is dedicated

To my parents

To my brother Eng. Hatim Osman Dirar

To all greater who worked hard providing knowledge for me

To all member of my family

ACKNOWLEDGEMENT

My thanks to Allah who enabled me to do this work. Furthermore I would like to extend my thanks to all who courage and support me to reach to the end of this thesis, but I give my special thanks to my supervisor Dr. Rashid Abdelhalem Saeed for his valuable help and support.

ROFIDA OSMAN

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المستخلص

اتصال آلة إلى آلة من المتوقع لتوفير الاتصال بين الآلات في كل مكان دون الحاجة إلى تدخل بشري. يسبب النمو السريع في عدد من اجهزة آلة إلى آلة في الشبكة اللاسلكية الى الحمولة الزائدة بسبب عدد كبير من اجهزة آلة إلى آلة محاولة للوصول إلى موارد الراديو في فترة قصيرة جدا من الزمن. في هذه الأطروحة تم مراجعة إجراءات الوصول العشوائي في شبكة التطور طويل الامل ثم استعراض وتقييم طرق مكافحة الحمل الزائد في الشبكة اللاسلكية .والحل المقترح هو ث-الثابتة الأسلوب مع اجهزة آلة إلى آلة المتأخرة التي تستخدم للسيطرة على الحمل الزائد للشبكة اللاسلكية في شبكة التطور طويل الامل محاكاة باستخدام بيئة الماتلاب.

وصول اجهزة آلة إلى آلة يتبع توزيع بيتا تستخدم لاشتقاق المعادلات واستخدامه لحساب الانتاجية، واحتمالات التصادم،النجاح والحمول لاجهزة آلة إلى آلة.

لدينا حالتين لحساب الحالة الأولى عندما ث لها قيمة عالية والحالة الثانية ث ذات القيمة المنخفضة تظهر في هذه النتائج أن مع ارتفاع قيمة ث احتمال نجاح جهاز آلة إلى آلة يرتفع حوالي 73٪ خلال عدد محدود من الأجهزة آلة إلى آلة ولها أقل احتمال حدوث تصادم ولكن في حالة أخرى في انخفاض قيمة ث اجهزة آلة إلى آلة لديها أقل احتمال نجاح حوالي 32٪ مع ارتفاع احتمال التصادم.

Abstract

Machine-to-machine (M2M) communications are expected to provide ubiquitous connectivity between machines without the need of human intervention. The rapid growth in the number of M2M devices causes the radio access network (RAN) overloading when a large number of M2M devices try to access the radio resources in a very short period of time. In this thesis review the random access procedure in LTE-A network and then review and evaluate the existing RAN overload control methods. The proposed solution is **P**-Persistent method with backlogged M2M devices which use to control RAN overload in LTE-A network simulate by using MATLAB environment.

M2M devices arrival follows Beta distribution to derive equations and use for calculating the throughput and probabilities of collision, success and idle for M2M devices.

Have two cases to calculate the first case when **P** have a high value and the second case **P** have low value this results show that with high value of **P** the success probability of M2M device is high about 73% within limited number of M2M devices and have lower collision probability but in the other case at low value of **P** the M2M devices have lower success probability about 32% with high collision probability.

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ABBREVIATIONS

APs	Access Points
ACB	Access Class Barring
BS	Base Station
BI	Backoff Indicator
CA	Carrier Aggregation
CoMP	Coordinated Multi-Point
CN	Core Network
DL	Down Link
DAB	Dynamic Access Barring
eNB	evolved Node B
eICIC	enhanced Inter Cell Interference Coordination
E-UTRAN	Evolved Universal Terrestrial Access Network
FDMA	Frequency Division Multiple Access
GSM	Global System for Mobile Communications
H2H	Human To Human
IEEE	Institute of Electrical and Electronics Engineer,
ITU	International Telecommunication Union
IMT-A	International Mobile Telecommunications advanced
LTE-A	Long Term Evolution Advance
MATLAB	MATrix LABoratory
M2M	Machine to Machine
MTC	Machine Type Communication
MIMO	Multiple Input Multiple Output

MBMS	Multimedia Broadcast/Multicast Service
MTCG	MTC gateway
MTCD	Machine Type Communication Device
NS	Numbering Scheme
OFDMA	Orthogonal Frequency Division Multiple Access
P	Persistent
PRA	Prioritized Random Access
PRACH	Physical Random Access Channel
PUSCH	Physical Uplink Shared Channel
QoS	Quality of Service
RACH	Random Access Channel
RAN	Radio Access Network
RA	Random Access
RA-TS	Random Access Time Slot
RAR	Random Access Response
RRC	Radio Resource Control
SC-FDMA	Single-Carrier FDMA
SON	Self Optimizing Networks
SOOC	Self Optimizing Overload Control
SIB	system information blocks
TA	Time Alignment
UL	UP Link
3GPP	Third Generation Partnership Project
4G	Fourth Generation