



SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF GRADUATE STUDIES

**COLLEGE OF COMPUTER SCIENCE AND INFORMATION
TECHNOLOGY**

Evaluating QoS of Cell Overlapping in 3G VoIP

تقييم جودة خدمات الخلايا المتداخلة لنقل الصوت عبر الإنترنت في الجيل الثالث

**This thesis is presented as a partial fulfillment for the degree of MSc in
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الآية

قال الله تعالى في كتابه الجليل:

(لَا يُكَلِّفُ اللَّهُ نَفْسًا إِلَّا وُسْعَهَا ۗ لَهَا مَا كَسَبَتْ وَعَلَيْهَا مَا اكْتَسَبَتْ ۗ رَبَّنَا لَا تُؤَاخِذْنَا إِنْ نَسِينَا أَوْ أَخْطَأْنَا ۗ رَبَّنَا وَلَا تَحْمِلْ عَلَيْنَا إِيْرًا كَمَا حَمَلْتَهُ عَلَى الَّذِينَ مِنْ قَبْلِنَا ۗ رَبَّنَا وَلَا تُحَمِّلْنَا مَا لَا طَاقَةَ لَنَا بِهِ ۗ وَاعْفُ عَنَّا وَاعْفِرْ لَنَا وَارْحَمْنَا ۗ أَنْتَ مَوْلَانَا فَانصُرْنَا عَلَى الْقَوْمِ الْكَافِرِينَ (286))

صدق الله العظيم

(سورة البقرة الآية (286))

Abstract

One important goal of mobile communication systems is to provide services to users at acceptable Quality of Services. Cell overlapping is a result of introducing small cells in an area while maintaining the original layer of large cells. In this research, We investigate the quality improvement on VoIP calls introduced by cell overlapping. We use OPNET to simulate an overlapped cell environment and evaluate QoS parameters without cell overlapping and compare that when cell overlapping is employed. The results show that cell of overlapping reduces call drop probability and minimize jitter and delay (overall End-to-End delay, average End-to-End delay, delay variation, packet delay variation).

المستخلص

من أهم أهداف أنظمة اتصالات الموبايل هو توفير الخدمات للمستخدمين بجودة عالية. الخلايا المترابطة او المتداخلة هي نتيجة إضافة عدد كبير من الخلايا الصغيرة في منطقة مع الحفاظ على الطبقة الأصلية للخلايا الكبيرة. في هذا البحث ، نتحقق من تحسين الجودة على مكالمات VoIP الناتجة عن overlapped cell باستخدامنا 14.5 OPNET لمحاكاة بيئة خلية مترابطة وتقييم جودة الخدمة ومقارنتها عند استخدام تداخل الخلية. وصلنا في هذا البحث إلى أن استخدام الخلايا المتداخلة يؤدي إلى تقليل إنقطاع الإتصال, وتقليل التقطع والتأخير(التأخير الكلي, التأخير الكلي المتوسط, وتغير التأخير, وتغير تأخير الحزم).

Dedication

To my parents and my husband who is support me to complete, To my all family and friends. To my daughter Anfaal. To everyone who taught me useful things in my life. To Dr.Niemah Izzeldin Mohamed Osman.

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LIST OF ABBREVIATIONS

3G	3rd Generations
4G	4th Generations
BS	Base station
QoS	Quality of Service
CAC	Call Admission Control
IMTS	Improve Mobile Telephone services
BCAC	Basic call Admission Control
MSCAC	Multi-Service Call Admission Control
RNC	Radio Network Controller
SGSN	Serving GPRS Support Node
GGSN	Gateway GPRS Support Node
FTP	File Transfer protocol
VoIP	Voice over Internet Protocol
GPRS	General Packet Radio Service

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