الآيـــــــة

بسم الله الرحمن الرحيم

{ إِقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ (1) خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ (2) اقْرَأْ وَرَبُّكَ الْأَكْرَمُ (3) الَّذِي عَلَّمَ بِالْقَلَمِ (4) عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ }.

(العلق :1-5)

صدق الله العظيم

Dedication

I dedicate this search

To my parents with great love and deep respect

To my brothers and my honored teachers

To each of the supported me and encouraged me to

accomplish this modest research

To that university, which taught me how to be creative:

Sudan University of Science & Technology

To each of realize that science promotes Nations

To every scientist and researcher contributed to the

development of his country

To the soil of the homeland and salute the flag

Acknowledgements

I am very thankful to everyone who all supported me, for I have completed my project effectively and moreover on time. Apart from the efforts of myself, the success of any project depends largely on the encouragement and guidelines of many others. I take this opportunity to express my gratitude to people who have been instrumental in the successful completion of this project. I would like to show my greatest appreciation to Dr. Mohamed Hussien Mohamed and Dr. Khaled Hamed and Dr. jakleen, I can't say thank you enough for his tremendous support and help. I feel motivated and encouraged every time I attend his meeting. Without his encouragement and guidance this project would not have materialized. The guidance and support received from all the members who contributed and who are contributing to this project, was vital for the success of the project. I am grateful for their constant support me. Last but not the least, I would like to thank my friends and colleagues and to those invisible hands that have helped me in this project .Thanking you.

المستخلص

الهدف من هذه الأطروحة هو عمل دراسة للمعيار 802,16 الصادر عن مؤسسة مهندسي الكهرباء والإلكترونيات حيث تتمحور الدراسة حول تحليل الطبقة المادية لهذا المعيار، من خلال إستخدام أنظمة المحاكاة المختلفة للتوصل لمفهوم وطريقة وطبيعة عمل المعيار (2004-2005) 802,16 ومميزاتة عن المعايير الأخرى ،حيث شملت الأطروحة دراسة لمختلف أنواع التعديل والترميزالمعتمده من قبل مؤسسة مهندسي الكهرباء والإلكترونيات الخاضعة لهذا المعيار ، ودراسه تأثيرات الخفوت المختلفة وأثرها على الإشارة وإشتملت الدراسة أيضاَ على مقارنة مستفيضة بين نوعين من الهوائيات أحادية الإرسال والإستقبال مع متعددة الإرسال أحادية الإستقبال المستخدمة في أنظمة الواي ماكس وبين الإرسال ذو الرشقة الواحدة و المتعددة, كذلك تم التطرق لتأثير البادئه الدورية وتأثيرها على معدل ارسال البيانات , كما تم دراسة مدى فاعلية استخدام موائم التعديل والترميز على النظام وعلى معدل خطأ البت لتوصل لأفضل تكوين يمكن من خلاله الحصول على أقصى قدر من الإنتاجية للنظام وتحسين أداء معدل خطأ البت. تم إنجاز هذا الهدف عن طريق إستخدام الوصف التحليلى لشبكة الواي ماكس و إنشاء نماذج رياضية وحاسوبية لمحاكاة البارومترات الخاصة بشبكة الواي ماكس. وبعد تحليل النظام تم تصميم جهاز أطلقنا عليه إسم الحاسبة الذكية الإصدار الأول. حيث تتميز بمقدرتها العاليه على ضبط موائم التعديل والترميز الخاضع للمعيار 802,16 عند قيم مناسبة تسمح للمستخدمين بالتعامل مع الشبكه بأقصى قدر ممكن من معدلات التراسل للبيانات بما يتناسب مع حالة القناة لكل مستخدم كما تم عمل نسخة برمجية لها بإستخدام واجهة المستخدم الرسومية ببرنامج الماتلاب.

Abstract

The objective of this thesis is a study of the standard 802.16 published by the Institute of Electrical and Electronics Engineers where centric study on analysis of the physical layer of this standard, Through the use of various simulation systems to reach the concept and the way and the nature of the work standard (2004-2005) 802.16 and its features for standards other, which included thesis study of different types of modification and encoding approved by the Foundation Electrical and Electronics Engineers subject to this standard, and study the effects of different fading and their impact on the signal and study included also compared extensive between two types of antennas mono transmitter and receiver with multicast mono reception used in systems WiMAX and between transmission with burst-one and multinational, was also addressed to the impact of the Cyclic Prefix and its impact on the rate of data transmission, have also been studying the effectiveness of the use of adapter amendment and coding on the system and At the rate of bit error to reach the best configuration in which you can get the maximum productivity of the system and improve performance bit error rate. These goals have been achieved through the use of analytical description of WiMAX and create mathematical models and computer simulations Parameters for WiMAX networks. After analyzing system is designed device launched by name calculator smart one version. Where characterized by their high-control Adaptive Modulation and Coding taxable standard 802.16 at appropriate values allow users to deal with the network with maximum rates Instant data commensurate with the channel for each user as work copied scripts to use graphics user Interface program MATLAB.

Contents

List of Figures

List of Tables

Abbreviations

3GPP	Third Generation Partnership Project
AAS	Adaptive Antenna System
AMC	Adaptive Modulation and Coding
AP	Access Point
ARQ	Automatic Retransmission Request
BTC	Block Turbo Coding
CC	Convolutional Coding
CIR	Channel Impulse Response
CSI	Channel State Information
CTC	Convolutional Turbo Coding
DFS	Dynamic Frequency Selection
FCH	Frame Control Header
FDM	Frequency Division Multiplexing
FEC	Forward Error Correction
HSDPA	High Speed Downlink Packet Access
ICI	Inter-Carrier Interference
IFFT	Inverse Fast Fourier Transform
IQ	In-phase Quadrature-phase
MAC	Medium Access Control
MAN	Metropolitan Area Network
MAP	Maximum A Posteriori
MEA	Multi-Element Antenna
MIMO	Multiple-Input Multiple-Output
MISO	Multiple-Input Simple-Output
MRC	Maximum Ratio Combining
MSS	Mobile Subscriber Station
PAM	Pulse Amplitude Modulation
PDA	Personal Digital Assistant
PDP	Power Delay Profile
QAM	Quadrature Amplitude Modulation
RRC	Root-Raised Cosine
RMS	Root Mean Square
RS	Reed-Solomon
SC	Single Carrier
SIMO	Single-Input Multiple-Output
SINR	Signal-to-Interference-plus-Noise Ratio
SISO	Single-Input Single-Output
SOHO	Small-Office Home-Office
SS	Spread Spectrum
SS	Subscriber Station
STBC	Space-Time Block Coding
STC	Space-Time Coding
UMTS	Universal Mobile Telecommunications System
WCDMA	Wide-band Code Division Multiple Access
WLAN	Wireless Local Area Network
WMAN	Wireless Metropolitan Area Network