الإستـهلال

بسم الله الرحمن الرحيم

قال تعالى:

" إِنْ أُرِيدُ إِلاَّ الإِصْلاَحَ مَا اسْتَطَعْتُ وَمَا تَوْفِيقِيَ إِلاَّ بِاللّهِ عَلَيْهِ تَوَكَّلْتُ وَإِلَيْهِ أُنِيبُ "

صدق الله العظيم

سورة هود

الآية (٨٨)

DEDICATION

To Our Precious Mothers

To Our fathers, brothers and Sisters

To Our teachers & our colleagues

We dedicate this work

AKNOWLEDGMENT

Deep and sincere gratitude to our supervisor, Dr. Ashraf Gasim Elsid. For his guidance in order to complete this project. We have to thank our teachers in electronic engineering department for their endless and continuous efforts. Our gratitude couldn’t be finished without giving our families and friends appreciation. They had always given us continuous encouragement and love specially our mothers.

Abstract

Wireless communication field is in continuous enhancement. Modern receivers and transmitters play an important role in the transmission process. They must be simple but more reliable to handle different applications. This Thesis concerned with simulating NOAA Microsatellite transmission. There are many types of signals that affect the satellite communication which is a transmission of data through wireless channel. The noise is the most common problem facing the satellite. The communication here will have high bit error rate, and hence high power consumption. In addition, many power saving methods were developed each has its own performance. That makes it difficult to use the suitable one. The microsatellite has been proposed as a solution to overcome the high power consumption with the use of two different models to be compared with Saleh model that reduce the BER value.

The performance of the system is analyzed by the error probability called Bit Error Rate (BER) along with calculating the system capacity, throughput and delay time. The simulation was performed and successfully tested using three main different models which are: Saleh model, Rapp model and cubic polynomial model. The simulation results of the system resemble very good performance and it was found that the Saleh model is the best method used that uses low power to optimize the transmission, and the delay time.

المستخلص

ان مجال الاتصالات اللاسلكيه في تطور مستمر. أجهزة الارسال والاستقبال المتطورة تلعب دورا مهما في عمليات ارسال البيانات. هذه الاجهزة يجب ان يتم تحديثها باستمرار بحيث تراعي البساطه والموثوقيه والقدرة على التعامل مع التطبيقات المختلفه.

هناك العديد من العوامل المؤثره سلبا على اشارات القمر الاصطناعي. و يعتبر الضجيج من اهمها، حيث يزيد من معدل الأخطاء في النظام ومقدار الطاقه المستهلكه في النهايه. و بالإضافه لوجود العديد من الطرق المستخدمه لتحسين استهلاك الطاقه في النظام، فان اختيار الطريقه المثلى يعد تحديا في حد ذاته.

هذا المشروع يقوم بعمل محاكاه للقمر الصناعي المصغر "نوا" المختص باستقبال صور مراقبه الارض والغلاف الجوي.

ان اداء النظام تم تحليله باستخدام معدل الاخطاء في البيانات المرسله، و زمن التأخير في استقبال البيانات، والطاقه الانتاجيه للنظام. وتم استخلاص النتائج عن طريق استقبال البيانات ومقارنه اداء النظام باستخدام ثلاثه مكبرات مختلفه.

تم تحسين الاداء عن طريق استخدام مكبر صالح ليعطي معدل اخطاء اقل من بقيه المكبرات التي تمت مقارنتها مع بعضها.

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Abbreviations & Symbols

AEGIS	Air-launched Earth-observing Ground Information System
3G	Third Generation
AWGN	Additive White Gaussian Noise
BER	Bit Error Rate
BSS	Broadcasting Satellite Service
COTS	Commercial Orbital Transportation Services
DARPA	Defence Advanced Research Projects Agency
dB	Deci bell
FSS	Fixed Satellite Service
Geo	Geostationary Orbit
GHz	Giga Hertz
GPS	Global Positioning Systems
GSM	Global System Mobile
GSO	Geosynchronous Orbit
HEO	High Earth Orbit
HPA	High Power Amplifier
HZ	Hertz
ITU	International Telecommunication Union
KHz	Kilo hertz
LAN	Local area network
Leo	Low Earth Orbit
LNA	Low Noise Amplifier
LOS	Line Of Sight

LPA	Low Pass Amplifier
MATLAB	Matrix Laboratory
MEO	Medium Earth Orbit
MHz	Mega Hertz
MSS	Mobile Satellite Service
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
Rx	Receiver
SNR	Signal to Noise ratio
SSPA	Solid State Power Amplifier
TT&T	Tracking, Telemetry and Telecomm
TWTA	Travelling Wave Tube Amplifier
TX	Transmitter
U.S	United States
UHF	Ultra High Frequency