# A heuristic Approach of Wimax System with Different Modulation Process

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*Abstract—* WiMAX has several competitors within the market, together with cellular 3G and LTE specifications. although every of those technologies has its own benefits and drawbacks, mobile WiMAX has a grip as a result of it's associate all IP-based packet switched network designed for information traffic WiMAX is that the finish to finish technology that has low price applications and walk resolution for broadband wireless access. WiMAX is predicated on the quality family outlined by IEEE 802.16 that provides Coverage of up to thirty miles (last mile) compared to alternative technologies. WiMAX has distinctive characteristics that permits the bottom station to handle thousands of subscriber stations (SS), it conjointly provides economical relinquishing procedure and Power management mechanism by introducing the sleeping mode for mobile stations. The key downside of WIMAX system is high BER and as BER will increase, signal to noise quantitative relation decreases. It means, the less the BER, result's the upper the SNR and also the higher communication quality This paper presents simulation of WiMAX exploitation OFDM technique exploitation secret writing technique . BER versus Eb/No curves area unit used for comparison the results.

*Keywords—* Wimax, Ofdm , wireless networks

## I. INTRODUCTION

WiMAX has several competitors within the market, together with cellular 3G and LTE specifications. although every of those technologies has its own benefits and drawbacks, mobile WiMAX has a grip as a result of it's associate all IP-based packet switched network designed for information traffic as compared to existing 3G technologies, that primarily support voice and allow data[2]. With worldwide ability within the frequency bands a pair of.3-2.4GHz, 2.496-2.69GHz and three.4-3.6 GHz, subscribers will use a similar device everywhere the world [2]. Mobile WiMAX has the advantage of upper dates exploitation OFDMA .With OFDMA, Mobile

WiMAX will support multiple users at the same time. OFDMA ends up in a big cell vary extension on the transmission (from mobile stations to base station), as a result of the transmit power is targeting atiny low variety of carriers and also the signal-to noise magnitude relation (SNR) at the receiver input is increased[2].

IEEE 802.16 is associate rising international broadband wireless access commonplace capable of delivering multiple megabits of shared information turnout supporting mounted, portable, and mobile operation. the quality offers an excellent deal of style flexibility together with support for licenced and license-exempt frequency bands, channel widths starting from one.25 to twenty MHz[3].

WiMAX IEEE commonplace 802.16 operates within the ten -66 gigahertz band and its extension 802.16a permits the usage of lower frequencies (2 -11 GHz) several of that are unregulated, further standards 802.16a to 802.16e offers Quality of service, ability, to develop access points and support for mobile moreover as mounted broadband. WiMAX will give 2 flavours of wireless services, looking on the frequency vary of operation, LOS and NLOS operations .The standard in operation between ten – 66GHz needs LOS operations, whereas lower frequency bands 2-11GHz alter NLOS operations [4].

The paper is organized as follows. In Section I, we tend to provide associate introduction to the WiMAX system. In Section II we tend to provide an evidence of WiMAX commonplace. In Section III we tend to provides a transient introduction of writing technique. Section IV illustarate the simulated WiMAX OFDM exploitation completely different modulation technique. It offers a short clarification of the transmitter, the channel and also the receiver blocks. In Section V, the results are obtained and In Section VI we tend to concludes this paper.

## II.    WIMAX STANDARDS

Before, there are many totally different standards that defines WIMAX, like 802.16a, 802.16d, and 802.16e. However, these days there square measure 2 legal standards that square measure addressed by WIMAX technology, the subsequent 2 standards square measure

- mounted WIMAX (IEEE 802.16-2004).
- Mobile WIMAX (IEEE 802.16-2005).

The original WIMAX normal IEEE 802.16 specified WIMAX for the ten to sixty six rate vary and once the updation it became the 802.16-2004 normal specified for two to eleven rate vary. The change to the 802.16-2004 normal that is that the 802.16-2005 normal can at first operate at a pair of.3 GHz, 2.5 GHz, 3.3 GHz, 3.4 to 3.8 rate spectrum bands [55]. though the on top of 2 terminologies (Fixed and Mobile WIMAX) don't seem to be WIMAX standards however these square measure essentially 2 general terms that square measure used normally everywhere to outline the fundamentals standards associated with WIMAX technology. A brief comparison of those 2 normal shown in Table one.

Table1. WiMAX Standards

| STANDARD | 802.16d WIMAX | 802.16e WIMAX |
|---|---|---|
| Release | 802.16d or 802.16-2004 (June 2005) | 802.16e or 802.16-2005 (December 2005) |
| Services Supported | Fixed, Limited Portability | Mobile, Portable, Fixed |
| Applications | Data connectivity , VoIP | Data connectivity Fixed and mobile VoIP |
| Services providers | DSL and cable modem | Mobile operators |
| Targeted | Service Providers, Wireless and Wired ISPs | DSL and cable, Modem service, provider, Wireless and Wired ISPs |
| Subscriber unit | Outdoor or Indoor CPE PCMCIA card for Laptops | Outdoor or Indoor CPE, PCMCIA card, Mini-card built in laptops, PDA, Smart phone |
| Certification | Started in August 2005 Certified products in January 2006 | 2007 |

## III.    CHANNEL CODING

Channel secret writing is Associate in Nursing inherent a part of any multi-carrier system. By victimization channel state data (CSI) in an exceedingly most chance sort FEC cryptography method a high diversity and, hence, high secret writing gain is achieved, particularly in weakening channels [6] Therefore, it's crucial to decide on the encoder in such the way that it permits the exploitation of sentimental data for cryptography. moreover, flexibility on the secret writing theme to derive completely different code rates (e.g. for unequal error protection) from a similar mother code is often most popular.

This flexibility might permit one to adapt the transmission theme to completely different transmission conditions.

Compared to one code, the most advantage of concatenated secret writing schemes is to get a lot of higher secret writing gains at low BERs with reduced quality. For concatenated secret writing, sometimes because the outer code a shortened Reed king code and because the inner code pierced convolution codes ar used .

The advantage of forward error correction is that a channel isn't needed, or that retransmission of knowledge will usually be avoided, at the value of upper information measure needs on average[7].

Reed king secret writing and Convolution secret writing are the 2 powerful error correction and detection ways to cut back the noise.
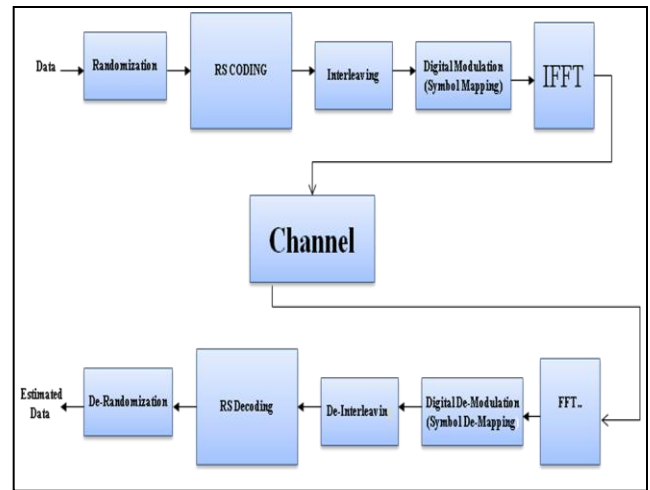


Fig. 1. WiMAX OFDM based Simulation Block Diagram.

## IV.    SYSTEM BLOCK DIAGRAM

### A. The Transmitter

Fig. 1 above shows the block diagram for the simulated WiMAX system used in this paper. At first, random bits are generated and then coded by a concatenated RS and Convolutional encoder. After coding, an interleaver is implemented to avoid long runs of low reliable bits at the decoder input. The coding, interleaving, and symbol mapping are the same as the ones defined in the WiMAX IEEE 802.16 specification [5]. In our simulation, we have simulated OFDM system in WiMAX .

### B. Parameter Specification

MATLAB may be a mathematical computing atmosphere that is incredibly effective to calculate and simulate the technical issues. This tool has the aptitude to perform totally many alternative tasks by its different tools particularly cases like matrix manipulation, plotting of functions and information, implementation of algorithms, creation of user interfaces and interfacing with alternative languages (C, C++, and FORTRAN).

Table 2 Simulation Parameter.

| PARAMETER | VALUE |
|---|---|
| BW(FFT) | 5MHz(256) |
| CYCLIC PREFIX | 1/4 |
| DIGITAL | 64 QAM |
| MODULATION | 256 QAM |
| Sampling Factor, | 144/125 |

## V.    SIMULATION RESULTS

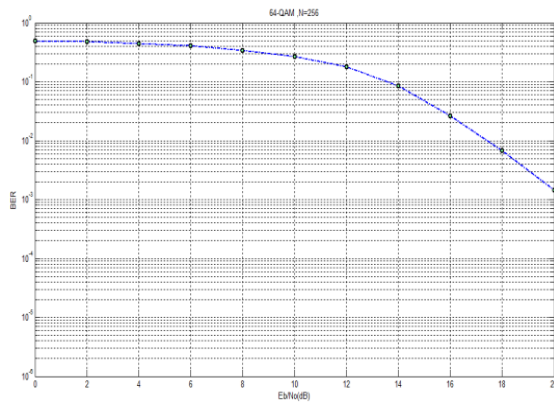In this section we will discuss the results obtained from the WiMAX platform by employing RS codes.



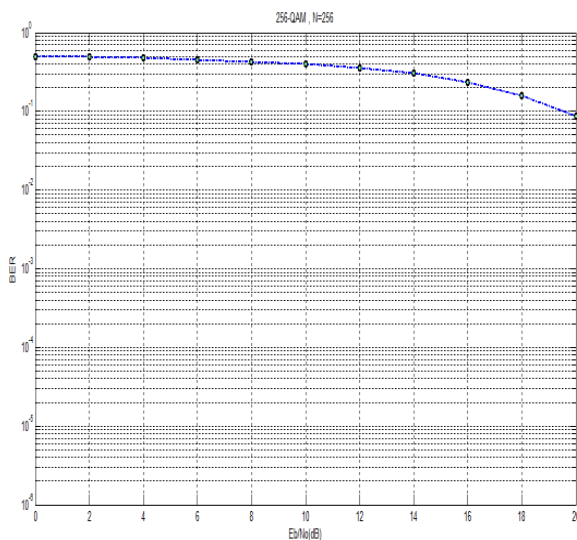Fig.2. BER versus Eb/No for 64 QAM with RS CODE for r =2/3.



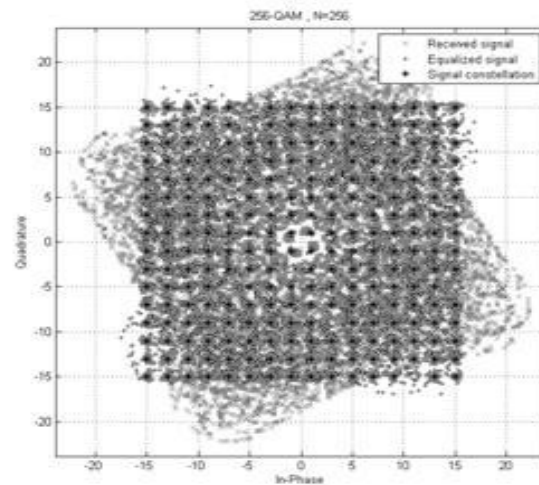Fig.3. BER versus Eb/No for 256 QAM with RS CODE for r =3/4



Fig.4 Scatter plot for 256 QAM

## VI.    CONCLUSION

In this paper, we present the BER analysis of the RS codes in WiMAX using modulation technique. In case of bandwidth utilization, the 64-QAM (or 256-QAM when used) modulation requires higher bandwidth and gives an excellent data rates as compared to others .At Eb/No =20 dB,BER =.001451 for 64 QAM,At Eb/No=20 db,BER=.08788 for 256 QAM ,hence at same Eb/No i.e 20 Db,BER of 256 QAM is high.

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