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Eureka -147 and COFDM: An Advanced Version for Bit Error Rate Used For Dab System

Sagar Kumar Gautam[1], Ravikant Kaushik[2]

[1] M. Tech Final year Student, Dept. of ECE, Sat Kabir institute of Technology & Management, Vill. Ladrawan, Bahadurgarh, Haryana.
[2] Assistant professor, Dept. of ECE, Sat Kabir institute of Technology & Management, Vill. Ladrawan, Bahadurgarh, Haryana.

ABSTRACT

The firsthand digital radio system Digital Audio Broadcasting (DAB) has the capability to replace the existing AM and FM audio broadcast services in many parts of the World in near future. This was developed in the 1990s by the Eureka 147 DAB project. DAB is very well right for mobile receivers and provides very high tolerance against multipath response and inter symbol interference (ISI). It allows use of single frequency networks (SFNs) for high frequency efficiency. The radio broadcasting such as AM/FM does not provide the listeners the audio quality they need in this era of compacted disc. Moreover these technologies are not capable of providing multi-programme sound and data services. The reception quality of these analog systems on portable radio is badly affected by Multipath fading (reflections from aircraft, vehicles, buildings, etc.) and shadowing [3]. These systems also suffer from interference from equipment, vehicles and other radio stations Radio is one of the most pervasive electronic mass media comprising of hundreds of programme providers, thousands of HF transmitters and billions of radio receivers global. Since the broadcasting began in the early 1920s, the market was widely covered by the AM services

INTRODUCTION TO BERC: EUREKA-147 TECHNOLOGY

Today with the invent of FM we live in a world of digital communication systems and services because of its advantages over analog systems like storage capacity, reliability, quality of service, trimness and many more. This chapter defines the theoretical background and history of DAB system along with its brief technical synopsis. Details of DAB models and system parameters are provided. COFDM basic theoretical concepts are also covered. This chapter pronounces the complete details of MATLAB model used to simulate the physical part of the DAB system in transmission mode II. This chapter accounts the results of the DAB system simulated along with some analysis. This chapter will clinch on the results from all the simulations done in MATLAB. Discussions and analysis are included in this section. There are, also a debate on the idea for future exertion

The system employed very low data compression and was not suitable for mobile reception. It used frequency in the range 10-12 GHz. Therefore it was not possible to provide service to large number of listeners. It was realized terrestrial digital sound broadcasting would do the job and to develop this new digital solution an international research project was necessary. So, in 1986 few organizations from France, Germany, United Kingdom and The Netherlands signed an agreement to cooperate in the development of a new standard and with this Eureka-147 project was born [2] [6].applications are discussed in and mobile object tracking issues are addressed.

Technical Overview

The Eureka 147 DAB system is very reliable, multi-programme, digital radio broadcasting system, intended mainly for robust reception by mobile, portable and fixed receivers, using simple antennas. ETSI, EN 300 401 [1] specifies the complete specification for the DAB transmitted signal.

The Eureka 147 DAB system consists of three main elements. These are:

- Source coding.

- Channel coding, Multiplexing and Transmission frame.
- COFDM Modulation.

The following sub-sections describe in detail the Technical aspects of DAB system that makes it highly robust against multipath affects providing CD quality audio services

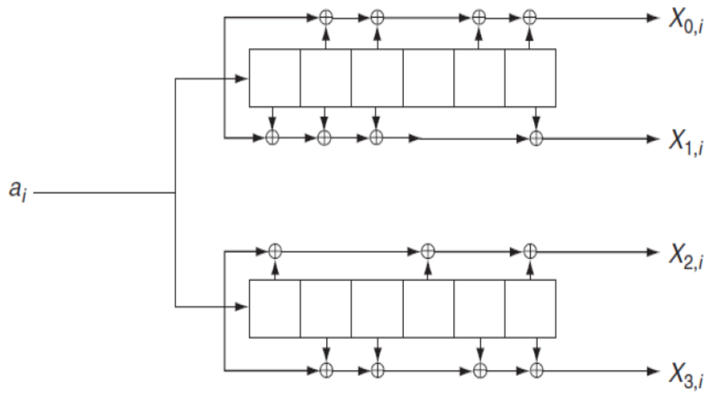

Figure 2. 3: Channel encoder for the DAB mother code [2].

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The channel coding is based on a convolutional code with constraint length 7. The octal forms of the generator polynomials are 133, 171, 145 and 133, respectively. The encoder can be thought as shift register shown in Figure 2.3.

The mother code has the code rate R =1/4, that is for each data bit ai the encoder produces four coded bits x0,i, x1,i, x2,i, and x3,i. The mother code is defined by [1]:

FACTOR AFFECTING BER

There are different kinds of factor which can effect Bit Error Rate are as follows:

(a) Interference

The interference levels present in a system are generally set by external factors and cannot be changed by the system design. However it is possible to set the bandwidth of the system. By reducing the bandwidth the level of interference can be reduced. However reducing the bandwidth limits the data throughput that can be achieved.

(b) Increase the power level

It is possible to increase the power level of the system so that the power per bit is increased. This has to be balanced against factor including the interference levels to other users and the impact of increasing the power output on the size of the power amplifier and overall power consumption and battery life, etc.

(c) Lower order modulation

Lower order modulation schemes can be used, but this is at the expense of data throughput.

(d) Reduced Bandwidth

Another approach that can be adopted to reduce the bit error rate is to reduce the bandwidth. Lower levels of noise will be received and therefore the signal to noise ratio will improve. Again this results in a reduction of the data throughput attainable.

Simulation Results

The simulation result for BER is shown by the help of matlab:

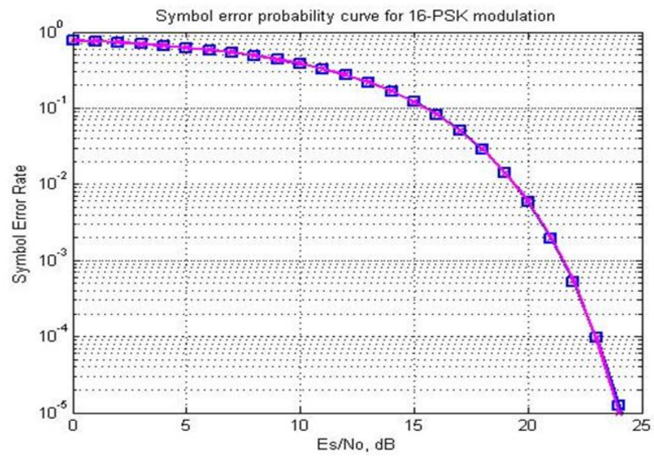

Fig1.1 Symbol error Rate Analysis for Digital Modulation SER for 16-PSK Modulation

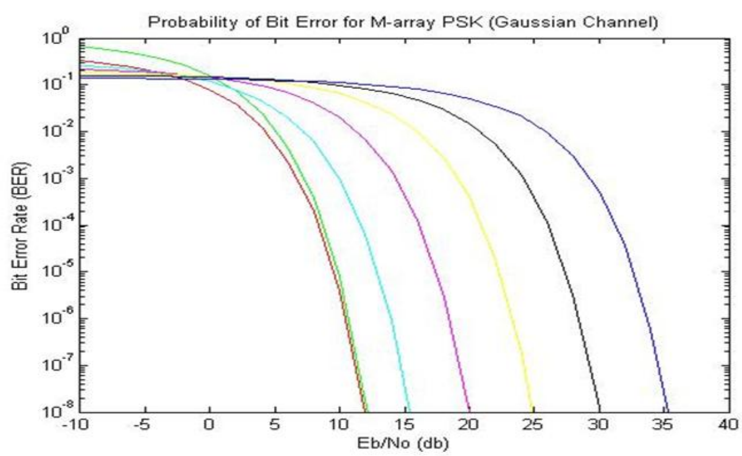

Fig1.2 BER for M-ary PSK for Gaussian Channel

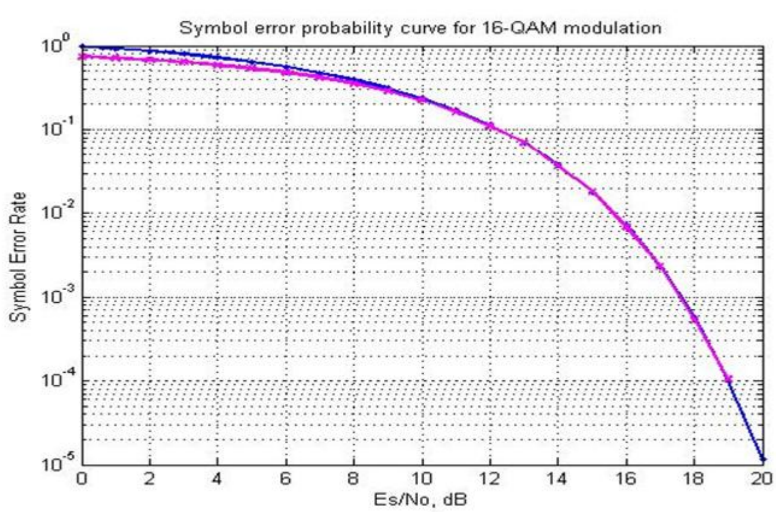

Fig1.3 Bit error rate (BER) Analysis for different channel

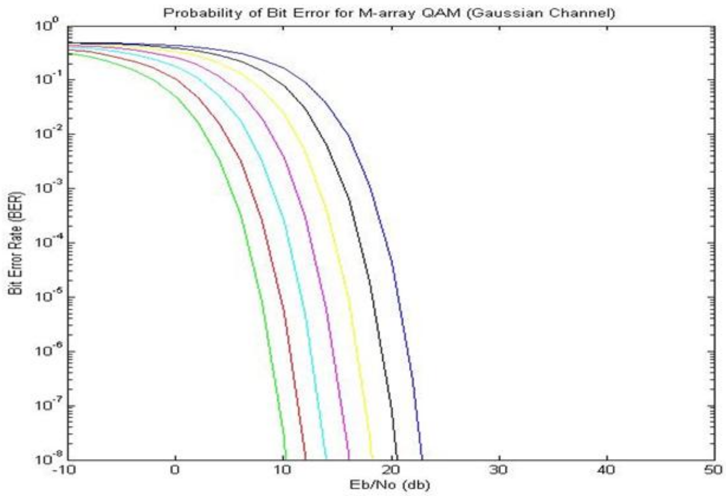

Fig 1.4 BER for M-ary QAM for Gaussian Channel

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