

**THE PERFORMANCE OF BLOCK DECODING  
USING DORSCH ALGORITHM**



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## ABSTRACT

The aim of this project is to investigate the Dorsch algorithm performance in the decoding process of various block codes. The error performance of both the decoding method are evaluated, compared and concluded.

The conventional decoding method is hard decision based whereby the message of the demodulator is quantized only to two levels. The demodulator makes a firm decision whether a bit is a 0 or a 1, which are called hard bits. The demodulator does not tell the decoder how reliable this decision is.

An important feature of the Dorsch algorithm is that it uses soft decision decoding. Soft decision occurs if the output of the demodulator, which are the soft bits is quantized to more than two levels. These soft bits are the measure of confidence for each decision. The decoding based on soft bits are referred to as soft decision decoding. The algorithm uses soft decision information to rank the reliability of the received symbols. The high reliability symbols are treated as the soft decision of the information values whereas the low reliability symbols are treated as parity checks for the information values. The high reliability symbols are called the *information set* and the low reliability symbols are called the *parity set*.

# CHAPTER 1

## INTRODUCTION

### 1.1 PREAMBLE

Reliable communication plays a vital role in today's mass involvement of digital data transmission. The concept of reliable communication was first introduced 57 years ago by Claude Shannon. In his famous paper, *A Mathematical Theory of Communication*, it is stated that the channel capacity has to be the upper limit for the rate of information transmission [2]. Otherwise, reliable communication cannot be achieved. Evolving from this concept, many error control coding was created based on redundancy to the transmitted information data. Decoding is the process of deciding what the original message is. This job is done by the decoder and it has the ability to detect and correct errors. This capability depends on the complexity of the decoder. Many has been successfully implemented and many are still to be tested and evaluated as for the case of the Dorsch algorithm.

The main purpose of this project is to investigate the Dorsch algorithm performance in the decoding process of various block codes. Dorsch algorithm was introduced by Dorsch. He created an algorithm that uses soft information decision to rank the reliability of the received symbols. The high reliability symbols are treated as the soft information of the information values whereas the low reliability symbols are treated