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# Review Paper on Different SAC Coding Technique

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***Abstract*— This paper study the different optical code division multiple access technique. These techniques are, modified double weight code (MDW), Random diagonal code (RD) and multi service code (MS). The comparison is made and show the analytical analysis with considering the different type of noise that are Phase induce intensity noise, Shot noise and Thermal noise. The performance of these designs is analyzed in the form of number of users and BER and received power versus BER is carried out. The code length comparison also done in this study.**

***Index Terms*—About four key**

**Multiple Access Interferance (MAI), Modified double weight code (MDW), Multi Service code (MS), Random Diagonal code (RD),Spectral Amplitude Coding(SAC).**

## 1. INTRODUCTION

In optical communication three multiplexing techniques available. These techniques are WDM.TDM and OCDMA. In Optical code division multiple access technique, each user assigns a specific code in term of spectral chips (codes). The OCDMA network having the many advantages compared to WDM, TDM. The OCDMA is a more secure network with easy availability at every corner of the optical network [1-3]. At the receiver end code is due correlates the corresponding user's information. The code of users is such that they posses the ideal in phase cross correlation [4-5]. There are various codes available on systems such as MDW, RD and MS code [6-8]. These codes are based on the ideal in phase unit cross correlation. The limited factor of these codes are longer length of code. The code shows the various performances with a number of users in the system. The paper is divided into following sections. Section 1 explains the codes of characteristics of different technique. The section III explores the comparative study of the results of these codes. Section IV concludes the analysis of different codes.

## 2. LITERATURE SURVEY

N.Ahmed,S.A.Aljunid, A.Fadil [6] explain the OCDMA system performance using modified double weight (MDW) code with NAND detection technique. In theoretical analysis, various noises and multiple-access interference (MAI) effect are taken into account. The system performance was characterized by the signal-to-noise ratio (SNR) and the bit- error-rate (BER). The analysis results obtained with the NAND detection technique and, compared with with complementary and AND subtraction techniques. The comparison results shows that the NAND detection technique, improve the system performance compared to complimentary and AND subtraction techniques.

Hilal Fadhil, Syed Aljunid [7] explored the new code for spectral-amplitude coding, optical code division multiple access that is know as called random diagonal code for spectral amplitude coding optical code division multiple access networks. Random diagonal code is constructed using code level and data level. They find that the performance of the random diagonal code shows better than modified frequency hopping and Hadamard code. It has been observed with simulation and theoretical calculation that bit-error rate for random diagonal code perform significantly better than present codes.

Majid H. Kakaee , Saleh Seyedzadeh, Hilal Adnan Fadhil, Siti Barirah Ahmad Anas [8] proposed the A Multi-Service Optical Code Division Multiple Access (MS-OCDMA) code based on Spectral Amplitude Coding (SAC) is proposed in this paper. The code proposed a setting a variable number of users in a basic code matrix. The matrix contains the a fixed code weight makes it more flexible in generating codewords. The service required for various network applications that is provided by choosing a different number of users for the basic code matrix of MS code. The properties of the proposed code are compared with other OCDMA codes. The performance of the MS code mathematically is analyzed and probability of error for users is plotted as a function of the number of active users and optical received power. Results show better response than the present scheme.

*Chracteristics of Codes*

(1)The Modified double weight code defined by the by the (L, W, $\lambda_C$) where the L length of code, W is the weight of code and $\lambda_C$ is the ideal in phase cross correlation.

The length of the basic code $L_B = 3\sum_{j=1}^{\frac{W}{2}} j$ (1)

Number of users, $K_B = \frac{W}{2} + 1$

Length of code $L = \frac{K}{K_B} \times L_B$

Mapping of basic matrix is carried out in case of a large number of users.

(2) The random diagonal code code defined by the by the (L, W, $\lambda_C$) where the L length of code , W is the weight of code and $\lambda_C$ is the ideal in phase cross correlation.

$$L = K + 2W - 3$$

(3) The random diagonal code code defined by the by the (L, W, $\lambda_C$) where the L length of code , W is the weight of code and $\lambda_C$ is the ideal in phase cross correlation.

The equation of basic code length is given as

$$L_B = \sum_{i=1}^{w} i - \sum_{i=1}^{w-K_B} i$$

$$L = \frac{K}{K_B} * L_B$$

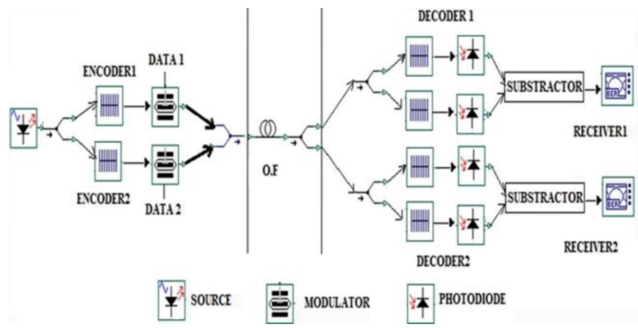


**Fig. 1. Encoder and Decoder Design.**

## MATHEMATICAL FORMULAS

For MDW code

$$SNR = \frac{\frac{\mathrm{R}^2 P_{sr}^{\ 2}\left[(2W-2)\right]^2}{L^2}}{\frac{P_{sr} eB\mathrm{R} W}{L}\left(\frac{4W+W^2}{2}\right) + \frac{B\mathrm{R}^2 P_{sr}^2}{L\Delta v}\frac{KW}{L}\left(\frac{4W+W^2}{2}\right) + \frac{4K_b T_n B}{R_L}}$$

For RD Code

$$SNR = \frac{\left(\frac{2\mathrm{R} P_{sr}}{N}\right)^2}{\frac{2P_{sr} eB\mathrm{R} W}{L} + \frac{B\mathrm{R}^2 P_{sr}^2}{L\Delta v}\frac{KW}{L}\left(K-1+W\right) + \frac{4K_b T_n B}{R_L}}$$