Journal of Engineering and Applied Sciences 15 (7): 1717-1723, 2020
ISSN: 1816-949X
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Data in ASCI Code Transmission Through Optical Fiber

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Abstract: This study state a data of ASCII code that arranged in the transmitter section to be received by the receiver section. For this reason we designed and immmplement a new system. The system depends on CW laser source, at wavelength of 1552 nm and power of 1-7 dBm. The fiber lengths are between 5 and 80 km distance. The system working in 10 GHz data Bit Rate using two type of photodiode (PIN and APD) as a receiver in order to get more stability system transmissions. The interconnect architecture is based on the use of a software optisys Version 7.0.

Key words: ASCII data, data transmission, CW laser, NRZ pulse generator, PIN photodiode, mach-zehnder modulator

INTRODUCTION

The transmission of the voice, television and data using laser light as light waves is evolve in a system with greater importance and use (Agrawal *et al*., 2012), the communication using laser has a high advantage a high security level as it narrow beam of the emitted light an interruption would result which notice clearly and immediate (Srinivas1 *et al*., 2017).

Today the information explosion traffic (internet, network, data and voice, multimedia) need a transmission medium, the optical fiber is use with numerous is quite and with handling of the bandwidth ability, it is paramount the amount of information. Fiber optics, the solution has proven with its relativity infinite bandwidth, to make an optical system three main part must be three a source of light, the optical fiber and detector of light (Kwan, 2002).

The three major parts that make up the fiber optical system is: a light source, the optical fiber and a light detector. The wavelengths use for optical fiber transmission is at the near-infrared portion and typically are 850, 1310 and 1550 nm, just above the visible ASCII code is done by using the optiwave simulation spectrum Fig. 1. At this research the transmission of data in program. The system consists of transmitter of the laser and receiver of the light signal which include the data information.

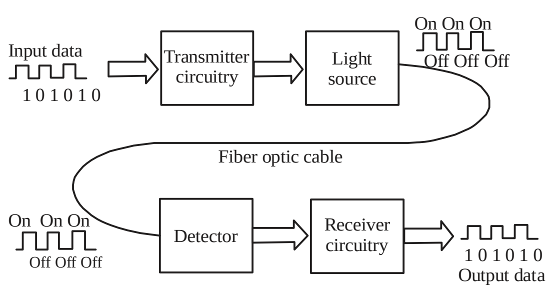

Fig. 1: The optical communication system

MATERIALS AND METHODS

CW laser: A device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation, it emit coherently, spatial coherence allows a laser to be focused to a tight spot, it also coherent and focused beam of photons (Kwan, 2002). A CW diodes laser are often directly modulated, this provide a very simple and effective method of transferring the data onto the optical signal (Malhotra and Malhotra, 2014).

Optical fiber communication: The optical fiber communication is a technology which uses the pulse of light to information transmission from point to point by an optical fiber. The transmission of information is generated by computer system as digital information. The optical fiber is a cylindrical dielectric waveguide such as silicon dioxide which made by a low-loss materials (Al-Temimi, 2014).

Photodiode: In the optical communication system the device used to detect the optical signal is photo detectors such as photodiode, the operation of conversion the light signal to a voltage is done using a photo detector, the using of illumination window junction with an anti-reflect coating the photon light is absorption. The absorption result of photons create electron-whole pairs (Aldouri and Jameel, 2015).

ASCII code (American Standard Code for Information Interchange): Is a standard character

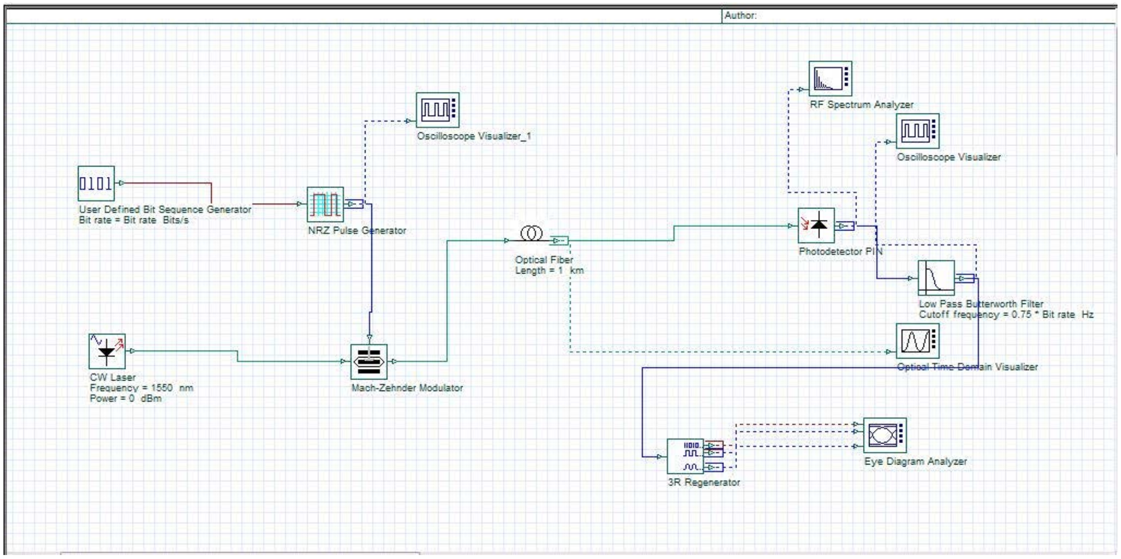

Fig. 2: The simulation system

encoding for electronic communication. The computers, telecommunication device using ASCII codes to represent text. Most modern based on ACSII to character-encoding schemes, to support many additional characters. It is a 128 characters in the ASCII table with values from 0 through 127. Thus, 7 bits are sufficient to represent a character in ASCII, however, most computers typically reserve 1 byte, (8 bits) for an ASCII character (Mackenzie, 1980).

The data inter the system by bit sequence generator this data is English letter in the ASCII code (8 bit add 0), the data review before transmitted and after received using oscilloscope visualize Fig. 2.

RESULTS AND DISCUSSION

First we try with simple binary code is H in ASCII code (01001000) at optical fiber length is 1 and 10 km the input and the output signal is shown in Fig. 3-5.

Now we try with a word of 8 letter like (FACEBOOK) first convert this word to the ASCII code as:

F = 1000110, A = 1000001, C = 1000011, E = 1000101, B = 1000010, O = 1001111, O = 1001111, K = 1001011

The whole word will be with 8 bit for every single letter (0100011001000001010000110100010101000010010011110100111101001011).

The output signal from the oscilloscope visualize and the eye diagram analyzer at 5, 10, 20 and 50 km optical fiber length and PIN photodiode as shown in Fig. 6-14. Table 1 is between optical fiber length and Min BER at 1 dBm power.

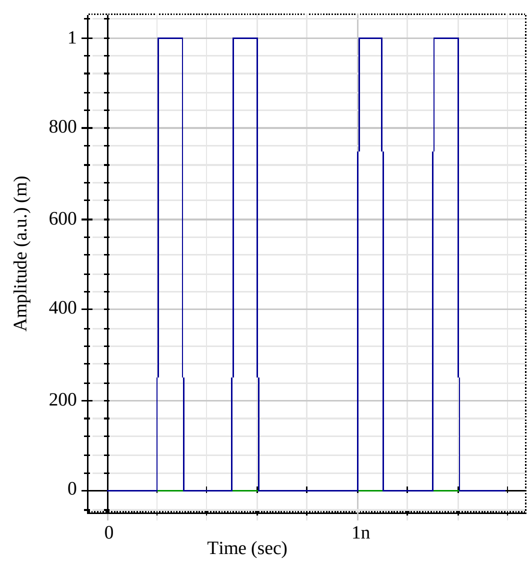

Fig. 3: Input signal of letter H in ASCI code

Table 1: Optical fiber length and Min BER at 1 dBm power

Min BER	Optical fiber length (km)
1.14791e-289	5
5.30179e-168	10
1.94492e-97	20
3.0118e-95	30
5.2745e-25	40
2.64559e-18	50
3.1535e-18	60
2.9782e-11	70
2.2175e-8	80

Figure 15 talking about the relation between the value of fiber length and min BER the fiber length starting from 5 km with BER of the output signal from the eye diagram Figure and the maximum value of fiber length 80 km, the values taking when the input power was remain at 1 dBm, at the result of these values the work of transmission data is the range permission. From Table 2 is between optical fiber length and Min BER at 7 dBm power.

Figure 12 talking about the relation between the value of fiber length and min BER the fiber length starting

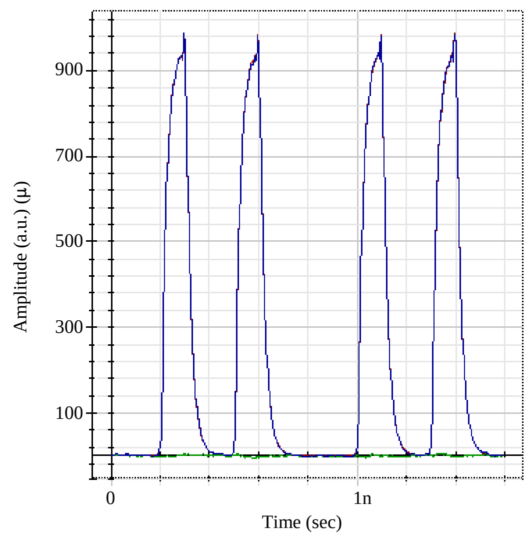

Fig. 4: The received signal at 1 km optical fiber

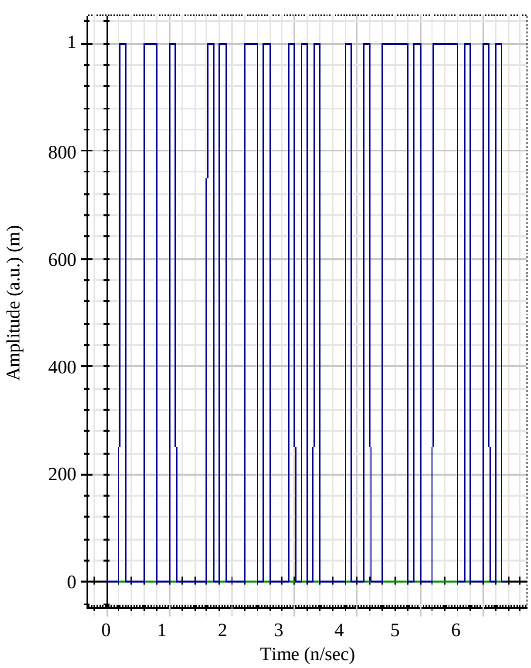

Fig. 5: The input signal of word facebook in ASCII code at 10 km optical fiber length

from 5 km with BER of the output signal from the eye diagram figure and the maximum value of fiber length 80 km, the values taking when the input power was remain at 7 dBm, at the result of these values the work of transmission data is the range permission. Now, Table 3 is at different laser power at 10 km optical fiber length. Now, we repeat all the result using photodiode APD. From Table 4 is between optical fiber length and Min BER at 1 dBm power and using photodiode APD.

From Table 5 is between optical fiber length and Min BER at 7 dBm power. The performance of laser communication system depend on the sensitivity and efficiency of optical system transmitter and receivers, many advantages of using laser over optical fiber like high transmission security, high bit rate and bit error is low, also the optical communication between two devices is more fast than other types. The change of parameters such as the type of photodiode and the type of laser use to increase the efficiency of the system and the data speed

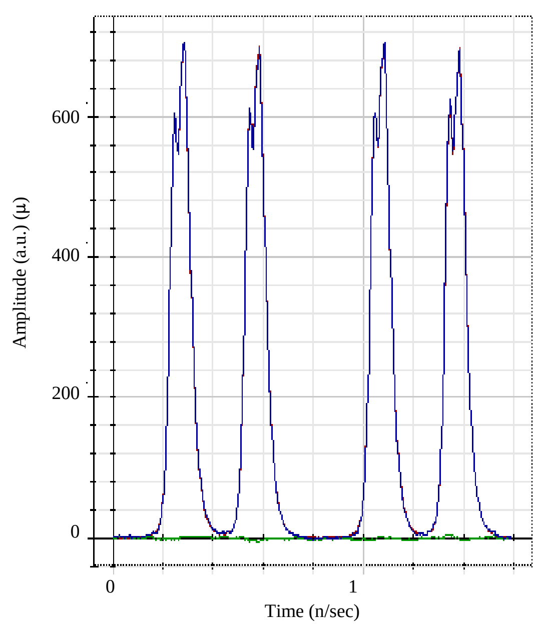

Fig. 6: The output signal of word at 10 Km optical fiber length

Table 2: Optical fiber length and Min BER at 7 dBm power

Min BER	Optical fiber length (km)
1.73339e-293	5
1.95246e-169	10
7.22831e-111	20
2.43053e-114	30
3.7866e-24	40
1.46329e-17	50
3.0918e-21	60
4.27998e-16	70
6.39169e-14	80

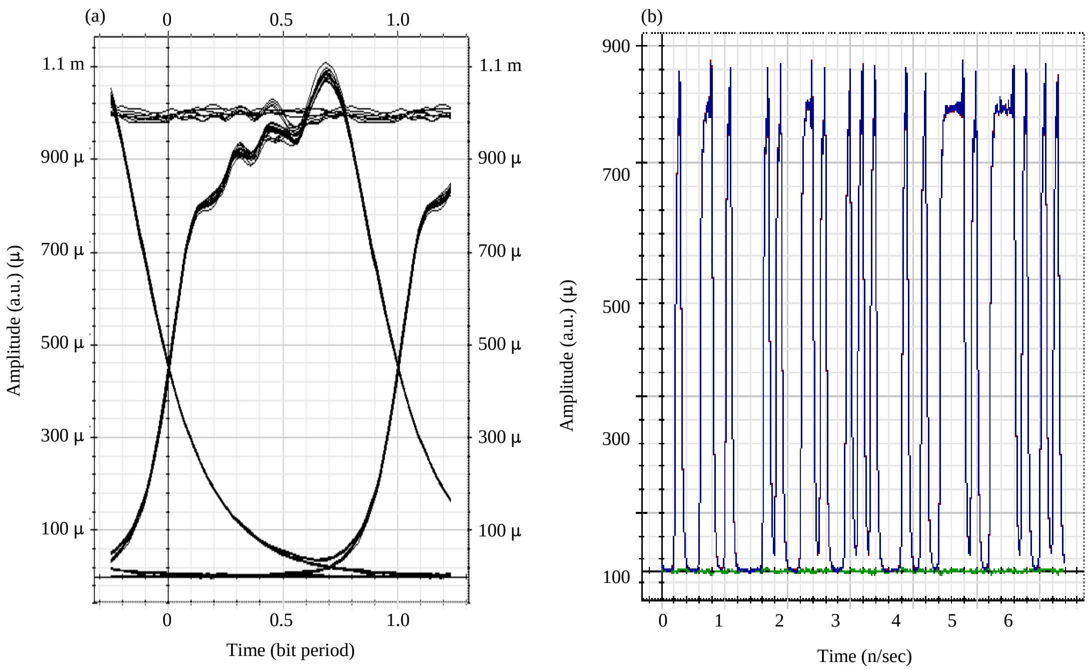

Fig. 7(a, b): The output signal at 5Km optical fiber length using eye diagram and oscilloscope (a) Oscilloscope visualizer Dbl click on objects to properties. Move objects with mouse drag and (b) Eye diagram analyzer Dbl on objects to open properties. Move objects with mouse drag

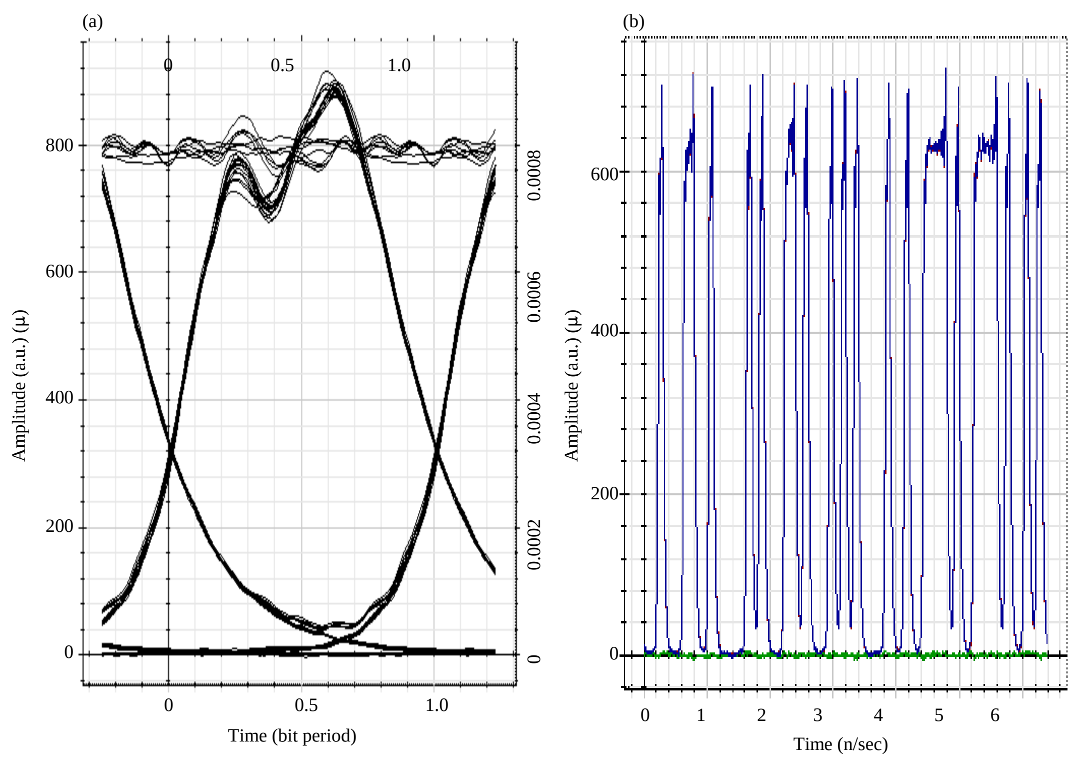

Fig. 8(a, b): The output signal at 10Km optical fiber length using eye diagram and oscilloscope, (a) Eye diagram analyzer Dbl on objects to open properties. Move objects with mouse drag and (b) Oscilloscope visualizer Dbl click on objects to open properties. Move objects with mouse drag

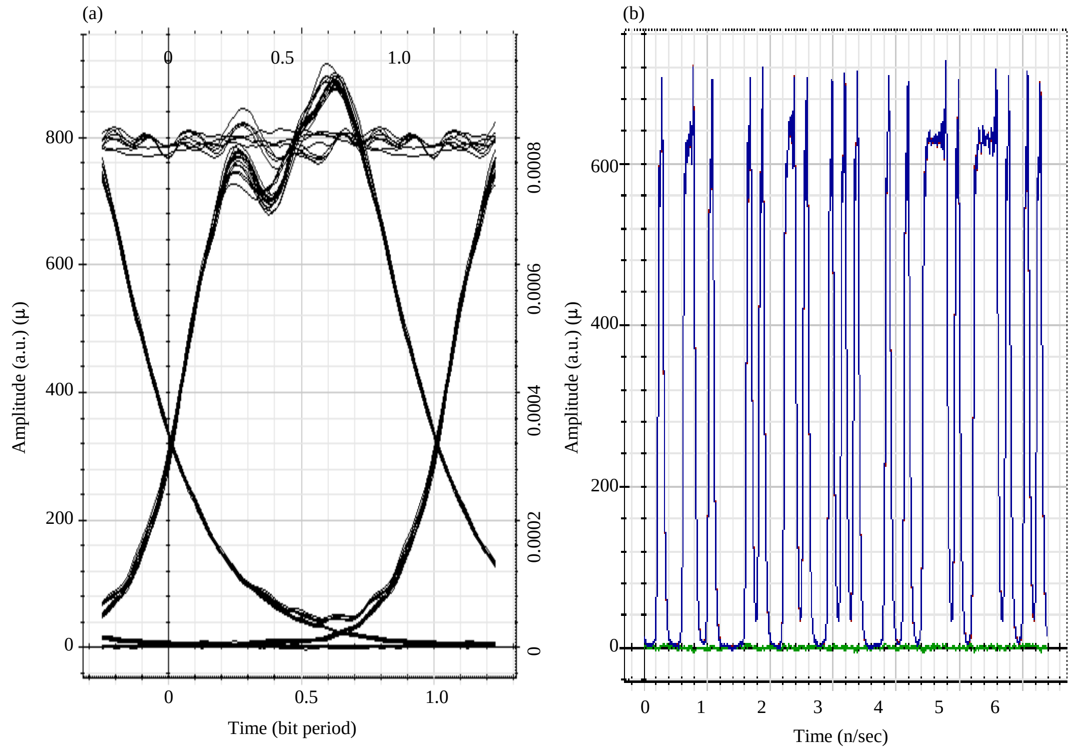

Fig. 9(a, b): The output signal at 20 Km optical fiber length using eye diagram and oscilloscope, (a) Eye diagram analyzer Dbl on objects to open properties. Move objects with mouse drag and (b) Oscilloscope visualizer Dbl click on objects to open properties. Move objects with mouse drag

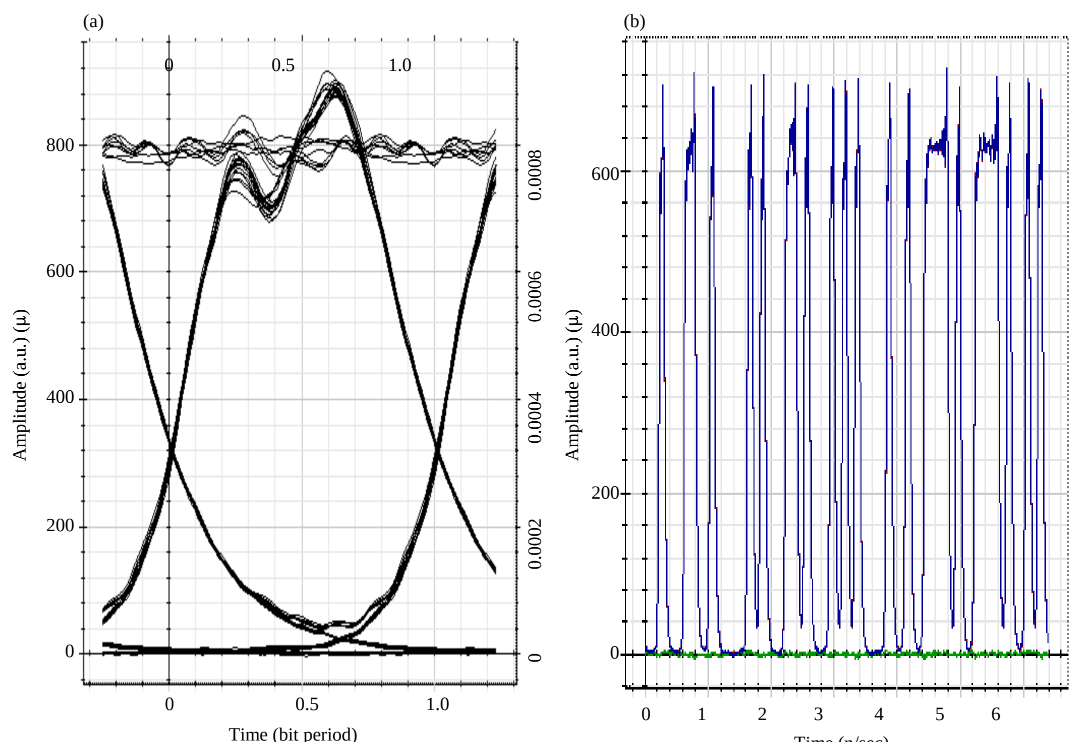

Fig. 10(a, b): The output signal at 50Km optical fiber length using eye diagram and oscilloscope, (a) Eye diagram analyzer Dbl on objects to open properties. Move objects with mouse drag and (b) Oscilloscope visualizer Dbl click on objects to open properties. Move objects with mouse drag

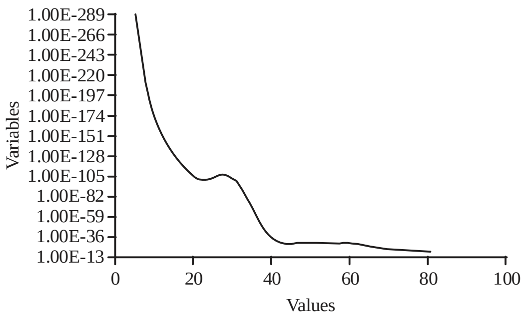

Fig. 11: The relation between the optical fiber length and min BER at 1 dBm laser power

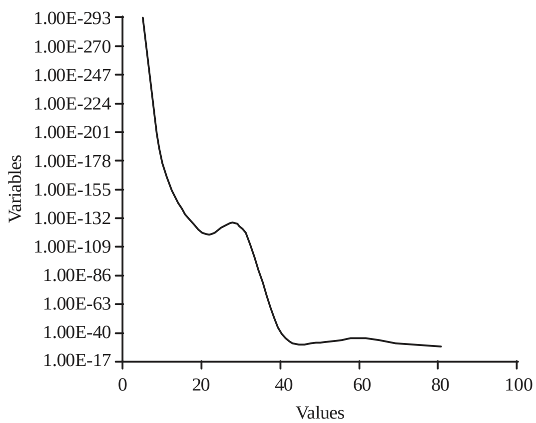

Fig. 12: The relation between the optical fiber length and min BER at 7 dBm laser power

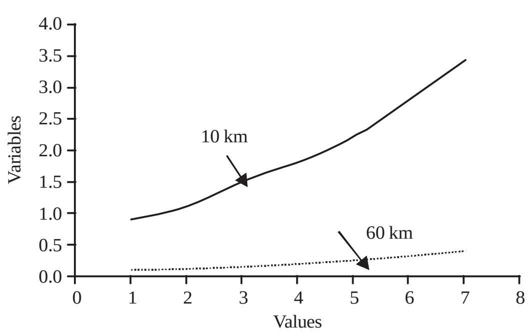

Fig. 13: The relation between the laser power and the amplitude

rate up to 9600 bits per second. The optiwave simulation system parameter use in this work is bit rate is 10 G bit/s, sample rate is 640 GHz, sequence length is 64 Bits, samples per bit is 64, two type of photodiode to compare the result in Table 1-4 (Fig. 15).

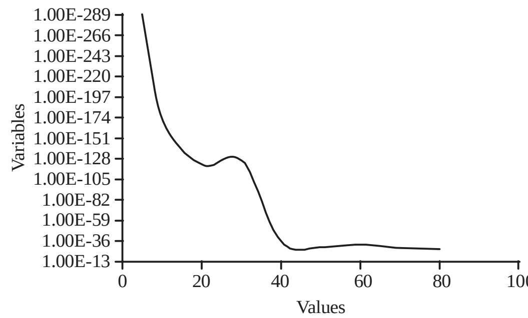

Fig. 14: The relation between the optical fiber length and min BER at 1 dBm laser power and using photodiode APD

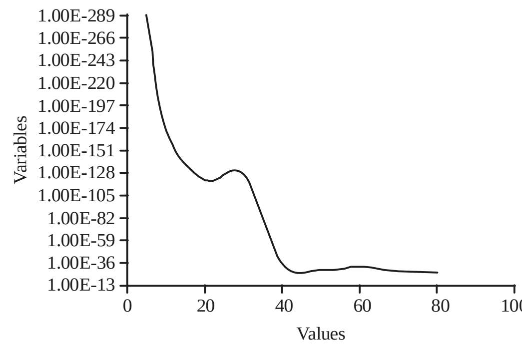

Fig. 15: The relation between the optical fiber length and min BER at 7dBm laser power using photodiode APD

Table 3: Amplitude of output signal at 60 km optical fiber length

Laser power (dBm)	Amplitude of output signal at 10 km optical fiber length	Amplitude of output signal at 10 km optical fiber length
1	0.9	0.1
2	1.1	0.125
3	1.5	0.15
4	1.8	0.2
5	2.2	0.25
6	2.8	0.31
7	3.4	0.4

Table 4: Optical fiber length and Min BER at 1 dBm power and using photodiode APD

Optical fiber length (km)	Min BER
5	4.96812e-281
10	1.99393e-161
20	1.77297e-105
30	7.49135e-108
40	3.00501e-24
50	1.17518e-17
60	6.75632e-19
70	5.30253e-14
80	1.72492e-11

First, we use the RZ pulse generation the output data is not as we reflective, so, all the result in this study using NRZ pulse generation.

Table 5: Optical fiber length and Min BER at 7 dBm power

Optical fiber length (km)	Min BER
5	5.57428e-289
10	7.98544e-167
20	1.4697e-113
30	4.19192e-119
40	8.95578e-24
50	2.88115e-17
60	9.36991e-21
70	1.34055e-16
80	1.41831e-14

CONCLUSION

From Table 1-4 we see that the min BER is increase with optical fiber increase and the results in the 7 dBm laser power is more clear than at 1 dBm laser power, the amplitude of the signal at 10 km optical fiber length is higher than the amplitude at 60 km. From Fig. 7-14 we see that the eye shape of the output signal and the amplitude from the oscilloscope is clear and sharp when the optical length is between 5-60 km when sending the data to the further distance the signal will not received as well as we want to see it.

REFERENCES

Agrawal, A., G. Kumar, M.N. Singh, P. Kumar and P. Mathur, 2012. Data transmission using laser light. Int. J. Adv. Comput. Technol. (IJACT), 1: 32-38.

Al-Temimi, M.F.M.K., 2014. Design and construction an optical system of data transfer in air using laser technology. Int. J. Curr. Eng. Technol., 4: 939-945.

Aldouri, M.Y. and L.W. Jameel, 2015. 32 channels slicing with AM modulator using LED. Int. J. Electron. Commun. Comput. Eng., 6: 674-678.

Kwan, S., 2002. Principles of optical fibers. Master Thesis, San Jose State University, San Jose, California.

Mackenzie, C.E., 1980. Coded Character Sets: History and Development. Addison-Wesley, Boston, Massachusetts, USA., ISBN:9780201144604, Pages: 513.

Malhotra, N.S. and H. Malhotra, 2014. Transmission of sound using lasers. Int. J. Adv. Res. Comput. Sci. Technol., 2: 137-140.

Srinivas1, V., R. Agarwal, S. Shinde and N.S. Kulkarni, 2017. Transmission of audio, DTMF and serial data using LASER. Int. Res. J. Eng. Technol., 4: 3361-3364.