4. Results and Discussions

A. Modulated Result.

The result for optical spectrum modulation is shown in the Figure: 3(a) and Figure: 3(b) below with more harmonics at the sideband of the spectrum. The data rate is set-to 10 Gb/s in this case. The result of both optical signals together with amplification before and after filtering based on the optical transmission link in optical domain shown in Figure: 3(a) and 3(b). Due to poor spectrum OFDM quality generated over from the baseband and transmission path, therefore enhancement spectrum option is needed through optical amplification. The performance is mainly hampered by the accumulated amplifier noise, the transmission channel of the system, internal performance system components and etc. the wavelength for CW laser is set to 193.1 THz, while the rest are to be set into default value from the optisystem. The optical fiber attenuation is 0.2 dB/km and the fiber length for the transmitting the signals is varied from 10 up to 50 km. Based on the Figure 3(a) and 3(b) above, we could see that the wavelength is 193.1 THz, but the power from both signal are different (about -38.868 dBm before the filtering and -21.013 dBm after the filtering). The optical modulation of RF carrier produces single sideband signals after filtering. To cause the RF OFDM signal to complex intermediate frequency proposed the architectures of a transmitter with an actual signal modulates the carrier with an optical MZM and one of the sidebands is suppressed with an optical filter. In the reception, the optical signal is detected by a photodiod and then demodulated. The RF frequency must be selected in order to remove the single-side band.

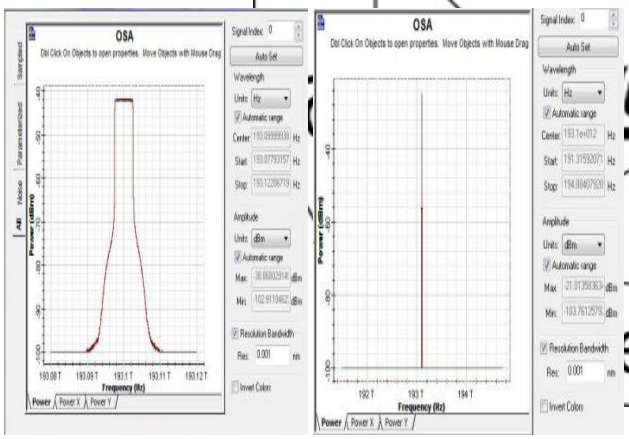

Figure 3: (a) Optical OFDM before Figure: 3(b) OFDM after filtering Filtering

B. RF Spectrum After Regeneration

From the output of optical fiber link, the RF frequency keeps 10 GHz with different power approximate to -61.35 dBm as in the Figure: 4(a) while the input power at the laser source is -4dBm. From Figure: 4(b), after the inverse procedure of regenerating the RF frequency, the maximum power is about -5 dBm For system performance, baseband signals are analyzed with oscilloscope visualize. Subsequently, RF and optical signals are analyzed with RF spectrum and optical spectrum analyzer, respectively. Meanwhile, recover signal are also study with electrical constellation visualizer can be utilized as in the Figure: 5 to demonstrate the true periodicity of an assumed periodic signal referring from the source.

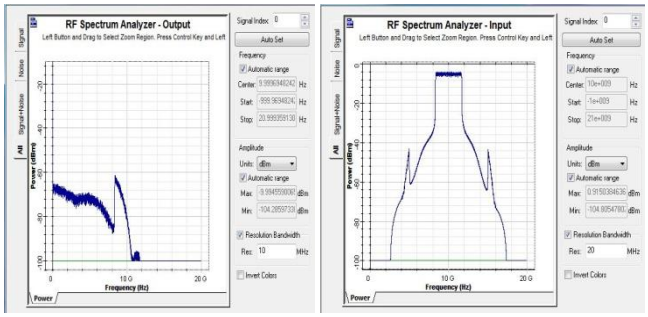

Figure 4(a): RF frequency at Figure: 4(b) : Radio frequency the photo diode spectrum before wireless link

Spectrum analyzer result is listed in table 1 as well as graphic in Figure: 5 below From the graphic set above, we can deduce while the number of loops is increased, the power after photo detector is not affected, but less the power at the laser diode output is less we have lower power at the reception. Therefore, there is more need of power at the Central Unit before launch the RF frequency through the optical fiber to reduce the use of electrical amplifiers at the Base Station side. Also from the Figure: 6(a), 6(b), 6(c), more the subcarriers , less the IQ factor of constellation at the reception that gives the following amplitude , 10.509a.u, 9.307a.u and 8.950a.u respectively from 256; 512 and 1024 subcarriers for a same laser power of -4 dBm. It is seen that noise with more subcarriers is mentioned in blue color in the Figure: 6(a), 6(b) and 6(c).

Table 1: Power received after photo detector

Power in dBm	No: of loops			
	2	3	4	4
-5	-36.45	-36.17	-33.03	-32.54
-1	-48.23	-46.85	-46.15	-42.33
-4	-54.01	-53.12	-51.85	-51.05
-10	-66.57	-66.29	-64.19	-63.24
-15	-76.26	-75.43	-74.01	-72.88
-20	-86.25	-86.15	-84.01	-82.89

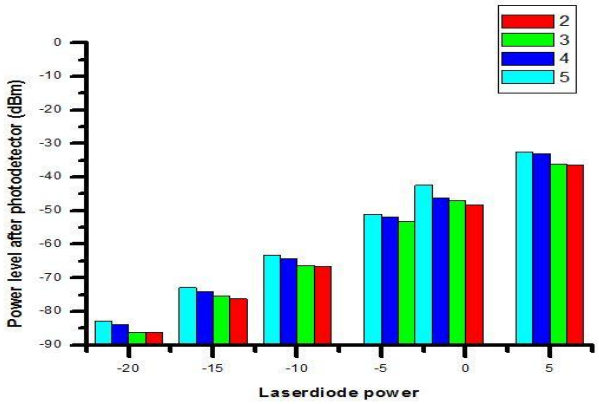

Figure 5: Graphical representation of the power after photo detector

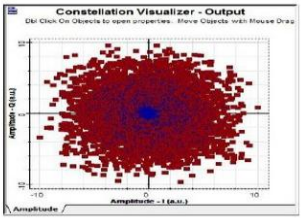

Figure 6(a)

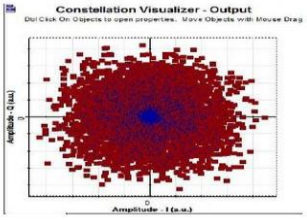

Figure 6(b)

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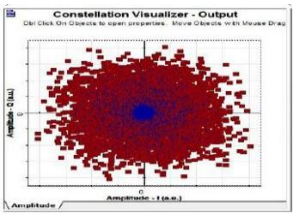

Figure: 6(c)

Figure 6: (a), 6(b), 6(c): Different value of IQ constellation at the reception. 256 subcarriers, 512 subcarriers, 1024 subcarriers

5. Conclusion

The use of OFDM in optical access networks and combining the OFDM modulation in RoF system a very high efficient communication system can be created which effectively utilizes the bandwidth. As Data rate increases, The outputs waveforms of RF spectrum analyzer & Optical spectrum analyzer began to broaden and hence quality decreases but comparing to existing communication standards OFDM-ROF system possess better efficiency. Similarly the constellation output also shows a decrease in Q-factor & constellation points increases. Hence by using OFDM in association with RoF a vigorous communication standard that efficiently uses the advantages of optical fiber can be created . Coherent system has high performance than direct detection system.

References

[1] Z. Kornain, M. A. Abu, and M. Y. Yacob "The Simulation of Indoor Service Range Prediction of Wireless Radio Access Point for Radio over Fiber System"IACSIT International Journal of Engineering and Technology, Vol. 5, No. 1, February 2013.\

[2] R. Karthikeyan and Dr. S. Prakasam, "A Survey on Radio over Fiber (RoF) for Wireless Broadband Access Technologies", International Journal of Computer Applications (0975-8887), Volume 64, No. 12, February 2013.

[3] Yoon-Khang Wong, S. M. Idrus, and I. A. Ghani "Performance Analysis of the OFDM Scheme for Wireless over Fiber Communication Link"International Journal of Computer Theory and Engineering, Vol. 4, No. 5, October 2012.

[4] Shikha Mahajan, Naresh Kumar, "Perormance Analysis of Coded OFDM Signal for Radio over Fiber Transmission"IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE), ISSN: 2278-1676, Volume 1, Issue 1, pp 49-52. (May-June 2012).

[5] Ajay Kumar Vyas, Dr. Navneet Agrawal, "Radio over Fiber: Future Technology of Communication", International Journal of Emerging Trends and Technology in Computer Science (IJETTCS), Vol. 1, Issue 2, July-August 2012.

[6] Affida M. Zin, Sevia M. Idrus, and Nadiatulhuda Zulkifli, Member, IEEE "The Characterization of Radio-over-Fiber Employed GPON Architecture for Wireless Distribution Network" International Journal of Machine Learning and Computing, Vol. 1, No. 5, December 2011.

[7] M. Rahman, J. Lee, Y. Park, and K. Kim, "Radio over Fiber as a Cost Effective Technology for Transmission of WiMAX Signals", World Arcade my of Science and Technology, 2009

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