Comparative Analysis of Pre-composition Techniques with FCC and PN codes using OptiSystem

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Abstract This paper represent results comparison obtain form OPTTD system for pre composition techniques with FCC and PN sequences in which output results for BER and Q factor for each FCC and PN have been compared and analyzed individually towards high speed and low attenuation of signal using OptiSystem tool. In this research paper finally it is comes out from various results that FCC is giving low BER and low attenuation in pre composition techniques as compare to the PN Sequence with same length.

Keywords DCF (Dispersion Compensating Fiber), Electronic Equalizer, BER (Bit error rate), Q-factor, Eye Height, Threshold, FCC (Flexible cross correlation), PN (Pseudo Random).

1. Introduction

1.1. Pre composition Scheme with FCC

In this the FCC code [0110, 1110, 0101, 0001] are given as input by user defined bit sequence generator. Its simulation setup is shown in figure. The corresponding results of this simulation setup are achieved at BER analyzer. In this BER analyzer various parameters like Q-factor, Min BER, Threshold value, Eye height etc. can be calculated.

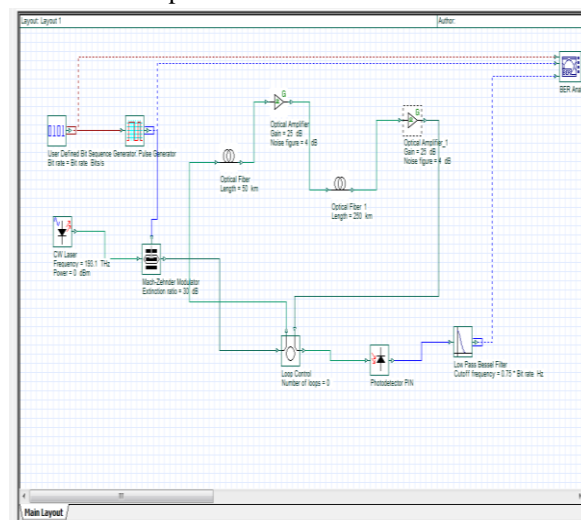Figure 1 shows the BER pattern of Pre Compensation with FCC codes

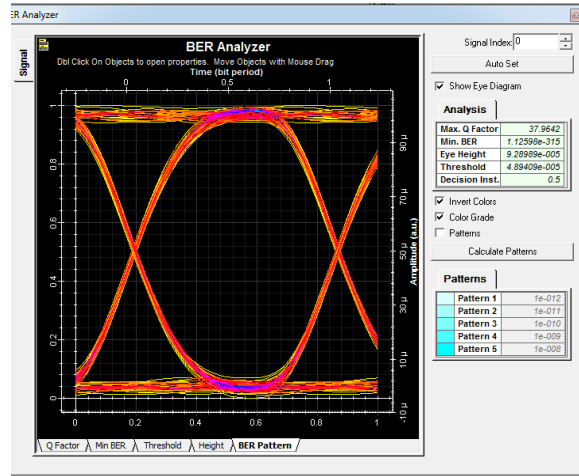*Figure 1: Pre Compensation with FCC sequence*

Figure 2: Screenshot of BER Pattern of Pre Compensation with FCC codes

This BER pattern gives us all information about the signal like its Q-factor value, this gives the value of BER and all other different parameters. Figure 3 is a screenshot of Min BER which we have obtained on BER analyzer after running the simulation setup on Opisystem software. This also gives the numeric value of BER
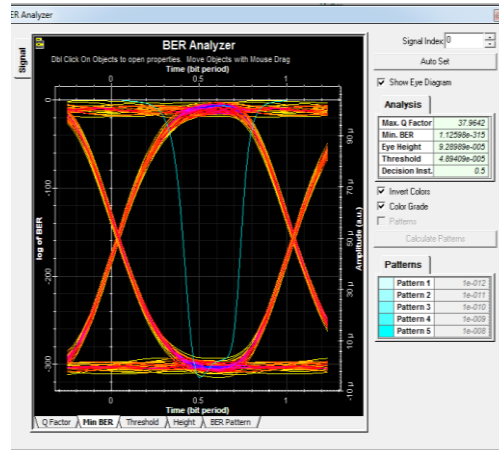

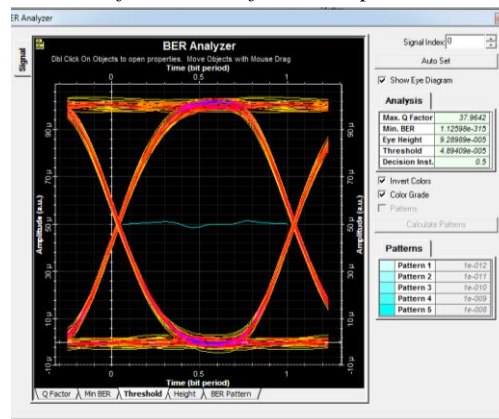*Figure 3: Screenshot of Min BER of Pre Compensation with FCC codes*

Figure 4: Screenshot of Threshold of Pre Compensation with FCC codes

Figure 4 is a screenshot of waveform of Threshold of Pre compensation scheme. The blue line in the figure 4 shows the waveform of Threshold in the eye diagram of this scheme with FCC input sequence.

1.2. Pre-composition Scheme with PN

In this method input sequence is given as PN sequence by directly connect Pseudo Random Bit Sequence generator to the input port of simulation setup. The Figure 5 shows the setup of Pre compensation with input of PN sequence scheme.
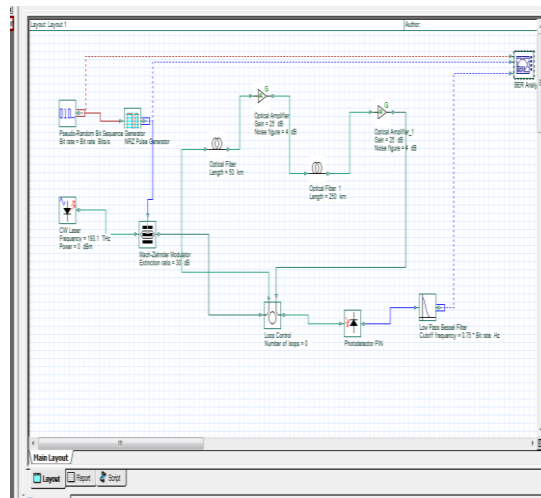

Figure 5: Pre Compensation with PN sequence

Figure 6 shows the BER pattern of Pre compensation with PN sequence of input code. This is a result of BER's analyzer.
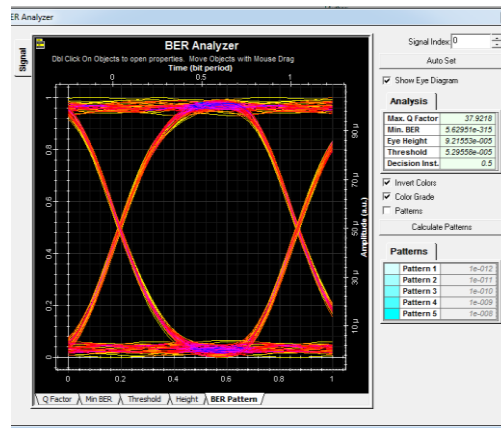

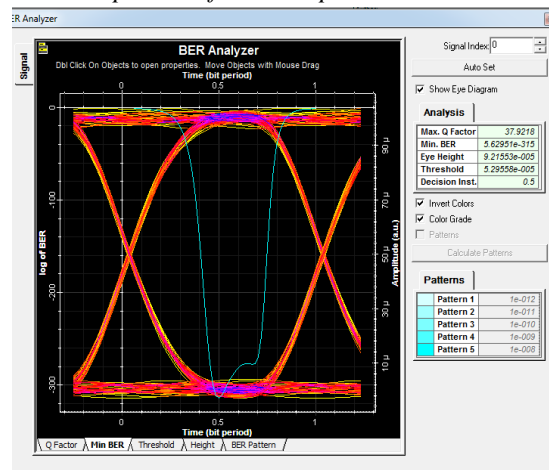*Figure 6: BER pattern of Pre Compensation with PN sequence*

Figure 7: Min BER of Pre Compensation with PN sequence

Figure 7 shows the Min BER of PN sequence. This sequence is less efficient as compared to FCC sequence. It is giving high amount of error in a bit period.
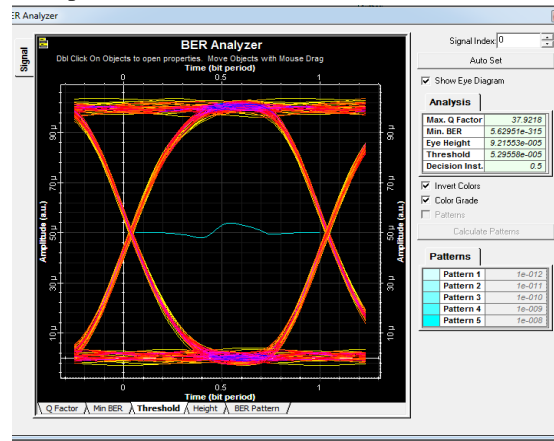

Figure 8: Threshold of Pre Compensation with PN sequence

2. Results & Discussion

Now from above result we have calculate all the results appear on the screen of OptiSystem tool and prepare a table to compare these two techniques and we found that all three parameter value in pre DSC with FCC is appear better as compare to PN

Techniques	Q- factor	Min BER	Threshold Value
Pre DCF with FCC	37.9642	1.12598e-315	4.89409e-005
Pre DCF with PN	37.9218	5.62951e-315	5.29558e-005

In above result it is clear that Q factor is better in FCC as found in PN and Threshold value is much lower in Pre FCC.

3. Conclusion

There are many techniques that can be utilized to compensate dispersion in an optical fiber communication link. Dispersion compensating fibers are considered to be the simplest as they are used in the fiber optical loop along with the standard fiber and posses opposite dispersion which is used to mitigate dispersion. Simulation studies show that the Pre compensation scheme is the best DCF scheme for Dispersion Compensation and it became more beneficial when we gave input as FCC codes.

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