

The effect of external modulation, no. of users and data rate on BER is shown in Figure 13. As the no. of users and the data rate increases the BER also increases. From the graph it is clear that the BER is minimum for a single user and at a data rate of 30 Gbps.

In direct modulation the BER ranges from -60 to -50, whereas in external modulation the BER ranges from -17.82 to -17.7. This is because direct modulation occurs when the electrical information stream varies the laser current directly to produce a different optical power. The main limitation of direct modulation is the broadening in the line width of the laser because of the laser on and off process. This results from the electrical signal that drives the laser source. The broadening of the line width is called chirp, and it will lead to degradation in the system performance.

Whereas in external modulation, the laser source emits a constant amplitude signal that enters the external modulator such as a Mach-Zehnder Modulator (MZM). The electrical signal then enters the external modulator to change the optical power level alone, it does not change the amplitude of the light. The constant amplitude signal from the laser source helps to avoid the chirp of the pulses which reduces the dispersion and makes this process more effective.

8. Conclusion

Optical Time Division Multiplexing (OTDM) provides a strategy for increasing the bit rate of digital optical fiber system beyond the bandwidth capabilities of the drive electronics. Further increase in bandwidth is provided by OTDM PON. An OTDM PON using both external and direct modulation has been analysed for different number of users. Graphical analysis and eye diagram analysis has been performed. From the graphical analysis of the OTDM PON it has been found that external modulation is better than direct modulation. It has also been found that the transmission performance is better for less number of users.

References

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