

Figure 2: Simulation Layout of Unidirectional WDM PON

A WDM multiplexer present at the OLT is used for combining these signals and transmitting as a single signal through the optical fiber. The WDM demultiplexer forms the Remote Node (RN), which splits the signals corresponding to each of the earlier wavelengths and the ONUs with the corresponding wavelengths receive the signals. The ONU block is same as that of TDM PON, which includes APD photodetector, low pass Bessel filter, 3R regenerator and BER analyzer.

4. Results and Discussions

4.1 Performance Analysis of Unidirectional TDM PON

The performance of a unidirectional TDM PON system with 2 users is analyzed using the parameters such as Q-factor and Bit Error Rate (BER). The quality and the bit error rate of the output signal that is received by the users are varying with the distance.

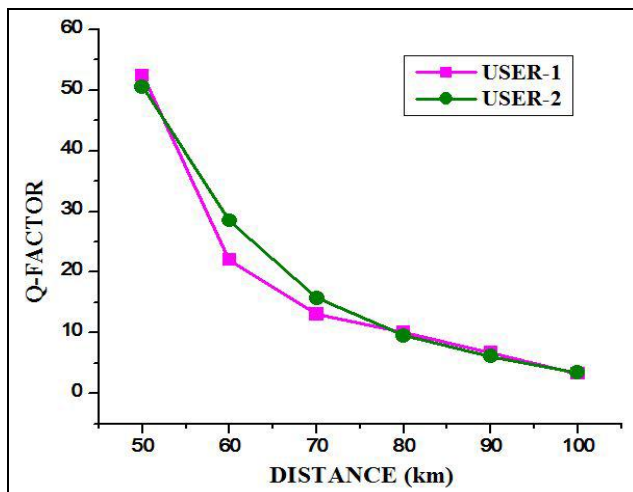


Figure 3: Relationship of Q-factor with Distance for Unidirectional TDM PON with 2 users

Figure 3 shows the variation of Q-factor with distance for the unidirectional TDM PON system. The graph shows that the Q-factor value is varied for a distance from 50 to 100 km at an input power of 0.2 dBm. The graphs show that as the distance increases, the Q-factor decreases.

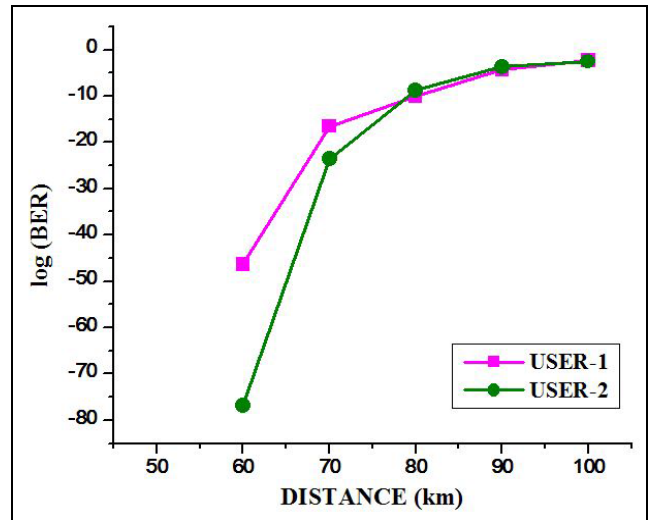


Figure 4: Relationship of log (BER) with Distance for Unidirectional TDM PON with 2 users

Figure 4 indicates the relationship between log (BER) with distance for the unidirectional TDM PON with 2 users. The BER value is also taken for a distance of 50 to 100 km at an input power of 0.2 dBm. The graph shows that as the distance increases, the log (BER) increases.

4.2 Performance Analysis of Unidirectional WDM PON

The performance of the unidirectional WDM PON system with 2 users is also analyzed using the parameters such as Q-factor and Bit Error Rate (BER). Figure 5 shows the relationship of Q-factor with distance for the unidirectional WDM PON system.

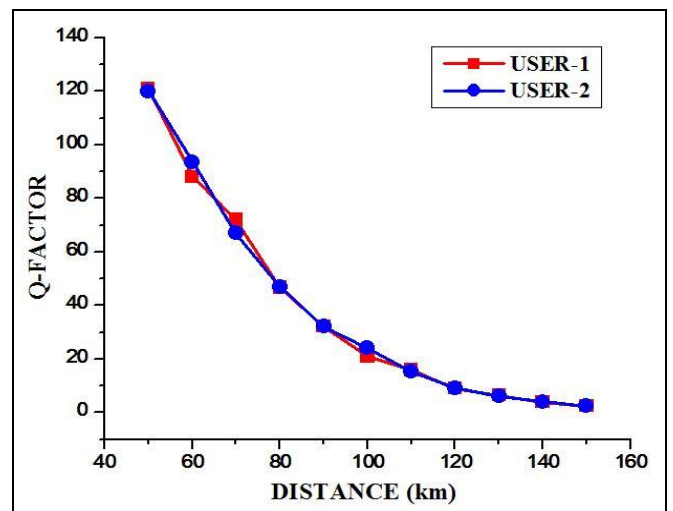


Figure 5: Relationship of Q-factor with Distance for Unidirectional WDM PON with 2 users

The graph explains that the Q-factor value is varied for a distance from 50 to 150 km at an input power of 0.2 dBm. The graphs show that as the distance increases, the Q-factor decreases. It can be seen that by using WDM PON, the quality of the received signal and the distance covered by the transmitted signal has been increased when compared with the TDM PON system.

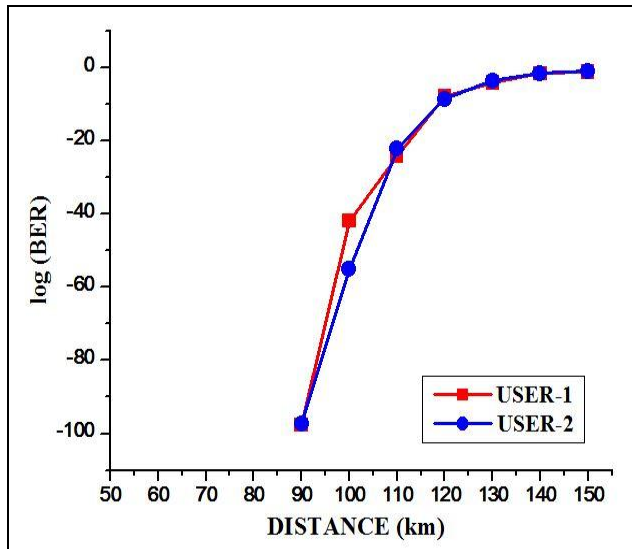


Figure 4: Relationship of log (BER) with Distance for Unidirectional WDM PON with 2 users

Figure 4 indicates the relationship between log (BER) with distance for the unidirectional WDM PON with 2 users. The BER value is also varied for a distance of 50 to 150 km at an input power of 0.2 dBm. The graph shows that as the distance increases, the log (BER) increases. Here also it can be seen that by using WDM PON, the number of errors in the received signal have reduced and the distance covered by the transmitted signal has been increased when compared with the TDM PON system.

5. Conclusion

Passive Optical Networks (PON) plays an important role in the development of the Fiber to the Home (FTTH) networks. The PON is considered as one of the most successful access architecture that can provide high capacity and long reach. From the analysis, it can be seen that for the same data rates, the performance of the unidirectional WDM PON with 2 users is better with high Q-factor and low BER compared to that of the unidirectional TDM PON system. From the graphs, it is found that, as the length of the fiber increases, the Q-factor decreases and the BER increases. As the technology has improved from the TDM to WDM, in the WDM PON, the quality of the received signal and the distance covered by the transmitted signal has been increased and the number of errors in the received signal has reduced when compared with the TDM PON system. Therefore, WDM PON is considered as the promising solution for the next generation Passive Optical Networks (PON) and also named as long range PONs.

References

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