Experiment - 7: To simulate Link Design (Power Budgeting & Rise Time Budgeting)

Date: -

1. **Aim:** To simulate an optical link and identify power & bandwidth requirements of the link for satisfactory performance.
2. **Requirements:** NI LabView

3. **Pre Experiment Exercise:**
   Brief Theory

The fiber loss depends upon the wavelength and also the physical conditions of the fiber. The fiber loss is generally higher than that specified by the manufacturers. This is primarily due to the micro-bending of the fiber. Also, the micro-bending loss is higher for 1550nm compared to 1310nm. Therefore the overall loss could be higher at 1550nm than at 1310nm, although intrinsically silica glass has minimum loss at 1550nm. Typical loss ate 1550nm may lie in the range 0.4-0.5 dB/km.
The splice loss could be between 0.05-0.1 dB per splice.
The connector loss is higher and could be 0.2-0.3 dB per connector
Power Budget:
Allowed Loss: $P_{allowed}$ = Ps - Pr
Actual Loss: $n*l_c+m*l_s+alpha*L+System\ Margin$

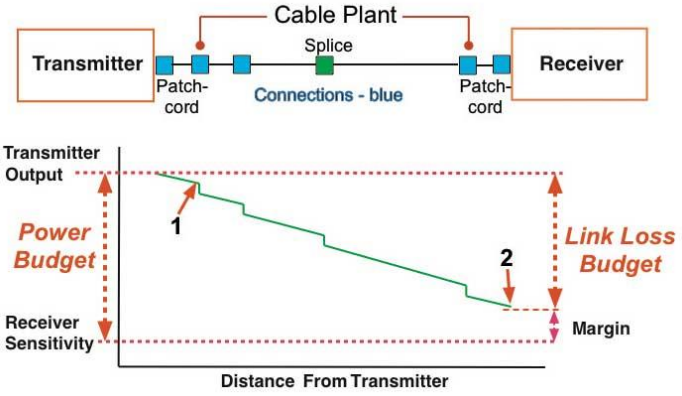
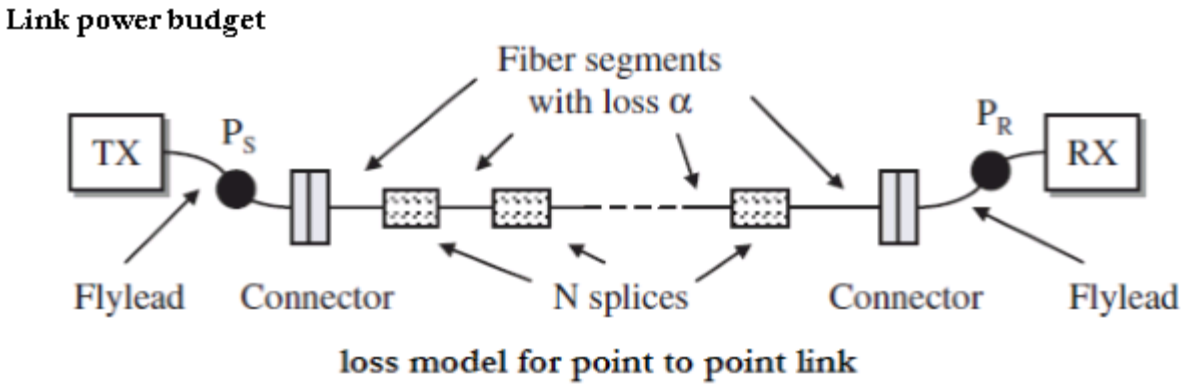


Fig. 1: Schematic of Link Budget Analysis



loss model for point to point link

Figure 3.19

4. Procedure

Perform Power Budget Analysis for the given system:

Components chosen for a digital link of 10km operating at 20Mbps are as follows

1. LED capable of launching an average power of 0.1mW at 0.85um
2. Fiber attenuation 2.5dB/km
3. Splices every 2km with loss 0.3dB per splice and connector loss of 1.5dB
4. The receiver power needed is -4.6dBm

5. Observations:

Attach the simulated block diagram and graphical observations

6. Conclusion/Comments:

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7. Questions

1. Explain Power Budget Analysis
2. What is Link Margin