

Fibre design problem 1

Assume a system with the following parameters

- Fibre Dispersion $D = 17\text{ps/nm.km}$
 - Source Linewidth = 1 MHz
 - Wavelength = 1550nm
 - Receiver sensitivity -30dBm at 1 Gbit/s at 1550 nm
 - Operating margin 3dB
 - Fibre losses: 0.2dB/km
- What is the length limit when considering losses at 1Gb/s and 10 Gb/s?

(Hint: To move to 10 Gb/s consider how SNR at the receiver changes with BW and how a change of a factor 10 in bandwidth would change the sensitivity)
 - What are the linewidths for 1Gbit/s and 10Gbit/s transmission?
(Hint: State the assumption you are making on modulation format and filtering)
 - What is the dispersion limit in term of link length at 1 Gbit/s and 10Gb/s?
 - How does it compare to the loss limit of the system at both data rates?