S-72.3340 Optical Networks

Exercise 2

1) Fiber chromatic dispersion introduces a power penalty that has to be considered in system design. Figure 1 below shows BER performance curves for a 10 Gbit/s link with no dispersion (0 ps/nm), and where dispersion levels have reached 1000 ps/nm and 1600 ps/nm.
   a) What is the maximum allowable dispersion power penalties for the case of 1000 ps/nm and 1600 ps/nm dispersion, assuming a BER requirement of 10^{-9}?
   b) If forward error correction (FEC) is employed the BER requirement is relaxed to 10^{-4}. What is the improvement in receiver sensitivity due to FEC considering the new BER requirement, for the case where dispersion is 1600 ps/nm?

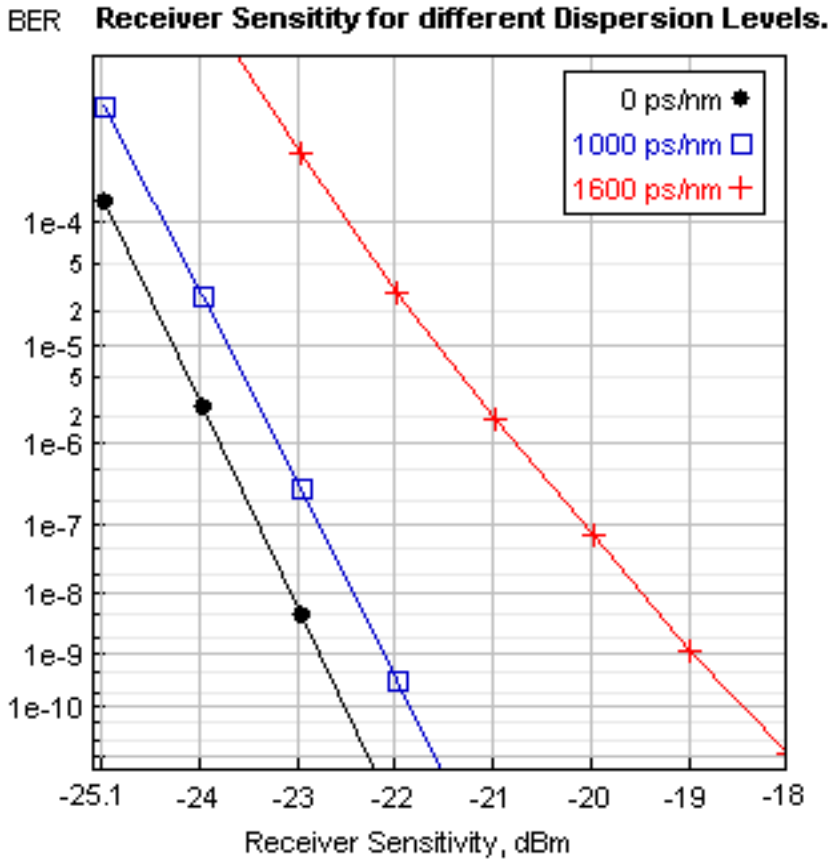

Figure 1 Receiver sensitivity for different levels of dispersion for a 10 Gbit/s link

2) You are given an assignment to make a point-to-point connection between two SDH path terminating equipment (PTE) operating at a STM-64 line rate. The resulting link can have a loss of anywhere from 16 to 22 dB. Unfortunately due to budgetary constraints, the only available PTE do not support the same interfaces. One PTE supports an L-64.2b interfaces and the other has V-64.3 interfaces. Some parameter specifications of these interfaces, extracted from the ITU-T standards are shown in Table 1 below. Suggest a way to interconnect these PTEs and make the link budget work. (Hint: You are allowed to use variable optical attenuators in the link).

Table 1 Parameters specified for L-64.2b and V-64.3 interfaces.

Parameter	L-64.2b	V-64.3
Transmitter	SLM	SLM
Wavelength range	1530 -1565 nm	1530 -1565 nm
Transmit power (maximum)	+13 dBm	+15 dBm
Transmit power (minimum)	+10 dBm	+12 dBm
Minimum receiver sensitivity (BER of 10^{-12})	-14 dBm	-24 dBm
Receiver overload	-3 dBm	-9 dBm