Homogeneous links

- In uncompensated links made of a single fiber type, optimal chromatic dispersion pre-compensation (CDP) was found to be 50% of the total link accumulated dispersion.
- However, the potential gain is modest.
- The newly proposed EGN model allows to predict performances with CDP.

Maximum Reach - \( N_{\text{span}} \)

PM-QPSK - \( R = 32 \) Gbaud
Nyquist-WDM - 15 channels
roll-off=0.05 – \( \Delta f = 33.6 \) GHz
\( L_{\text{span}} = 120 \) km – BER target = \( 10^{-2} \)

Non-Linear Interference (NLI) prediction @ \( P_{\text{TX, max}} \)

\[
\text{SNR}_{\text{NLI}} = \frac{P_{\text{TX, max}}}{P_{\text{NLI}}}
\]
Inhomogeneous links

- We consider inhomogeneous links made of two fiber types: LS and SMF
- CDP, when applied, sets the zero accumulated dispersion in the middle of the LS section, this is conceivably close to the optimum
  - $D_{PRE} = -31600$ ps/nm in the SMF+LS case
  - $D_{PRE} = +1800$ ps/nm in the LS+SMF case

Launch Power Optimization based on EGN-model

$$OSNR_{NLj} = \frac{P_{RX}}{P_{ASE} + P_{NLj}}$$

Conclusions

- Applying CDP the OSNR gain in inhomogeneous links depends on fiber order and may be non-negligible
- CDP equalizes the performance in two directions
- CDP dramatically increases signal PAPR: this may result in substantial penalties due to TX-DAC resolution and range

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