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Flexible Spectrum and the effects of Crosstalk on a 20 Gb/s Signal over a 12 km Optical Fibre

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Abstract content
   (Max 300 words)
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A flexible spectrum is an elastic grid whose frequencies are dynamically assigned to multiple channels in scalable and efficient high capacity systems. With varying traffic conditions, flexible spectrum networks employ technologies such as the Reconfigurable Optical Add/Drop Multiplexers (ROADMs) to remotely assign channels and avoid static wavelength assignments providing high density. In such networks, the difference in the channel spacing between these transmitting channels might however induce multichannel interferences such as crosstalk. In this work, we theoretically investigate and discuss the implications of crosstalk penalty in telecommunication systems. This is done by considering channels spacings 25 GHz, 31.25 GHz, 37.5 GHz and 50 GHz as the power of the interfering channel is varied from 0 dBm to 25 dBm. A penalty of 0.7 dB to 11 dB for channel spacings of 50 GHz to 25 GHz was obtained for a 12 km fibre transmission. The 11 dB penalty realized in 25 GHz is due to the detrimental crosstalk from the interfering channel resulting to power sharing. Therefore, the presence of crosstalk in the system degrades the quality of the signal by increasing the bit error rate (BER). The significance of the result is to identify the optimal transmission channel spacing that provides low penalty for a specific fibre link and the use of impairment-aware controls to improve the spectrum efficiency.

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