A signal impairment-aware scheme for next-gen flexible spectrum in 10 Gb/s VCSEL metro-access optical fibre networks

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Abstract

We experimentally characterized and optimized link performance of a multi-node flexible spectrum network. The cheap and low power consuming and wavelength tunable vertical cavity surface-emitting lasers (VCSELs) have been used to create colourless and wavelength selective flexible transmitters to enable up to 10 Gb/s per channel/wavelength signals. With a –3.8 dBm VCSEL optical power and chromatic dispersion mitigation, a 25 km multi-node network has been experimentally demonstrated with a transmission penalty range of 0.2–3.2 dB. Moreover, an impairment-aware mathematical model has been created to predict signal continuity for crosstalk and dispersion penalties for a hop-to-hop signal transmission and a bit error-rate (BER) evaluation at the 10^{-9} threshold level. This study is vital for creating routing and network algorithms for the next-generation optical fibre networks.