Long-Haul Dense Space Division Multiplexed Transmission over Low-Crosstalk Heterogeneous 32-Core Transmission Line Using Partial Recirculating Loop System

In this paper, we present long-haul 32-core dense space division multiplexed (DSDM) unidirectional transmission over a single-mode multicore transmission line. We developed a low-crosstalk heterogeneous 32-core fiber with a square lattice arrangement, and a novel partial recirculating loop system. The span crosstalk of the 51.4-km 32-core transmission line was less than −34.5 dB. This allowed the transmission of polarization division multiplexed 16 quadrature amplitude modulation (PDM-16QAM) signals through all 32-cores over a long distance exceeding a thousand km. We demonstrate 32-core DSDM 20 wavelength division multiplexed (WDM) PDM-16QAM transmission over 1644.8 km with a high aggregate spectral efficiency of 201.46 b/s/Hz. Additionally, we examine the effect of crosstalk on the transmission performance of each core, and show that the Q-penalty has strong correlation with inter-core crosstalk.

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