A low-cost, high-speed SDM-WDM-PON architecture is proposed by using a multi-core fiber (MCF) and intensity modulation/directly detection (IM/DD). One of the MCF cores is used for sending laser sources from optical line terminal (OLT) to optical network unit (ONU), thus facilitating laserless and colorless ONUs, and providing ease of network management and maintenance. In addition, the wavelengths of the ONUs are controlled on the OLT side, which also enables flexible optical networks. Thanks to the low inter-core crosstalk of a MCF, downstream (DS) and upstream (US) signals are transmitted independently in different cores of the MCF, not only increasing the aggregated capacity but also avoiding the Rayleigh backscattering noise. Finally, a proof-of-principle experiment is performed by using a 7-core fiber, achieving 300 /120 Gb/s aggregated capacity for DS and US (3 Â— cores, 4 Â— wavelengths, 25/10 Gb/s per wavelength), respectively.
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