A Rayleigh Backscattering Noise Resilient and Cost Effective Single Fiber WDM-PON Scheme using DQPSK and Intensity Re-modulation Technique

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Abstract

In this research work, we propose and simulate a Rayleigh backscattering noise-resilient and cost-effective scheme of standard single mode SSM, single fiber bi-directional optical access network using wavelength division multiplexed passive optical network (WDM-PON) technology. A differential quadrature phase shift keying (DQPSK) optical signal is used at optical line terminal (OLT) for downstream (DS) communication and intensity re-modulation technique is used at optical network unit (ONU) in upstream (US) optical signal, while using centralized laser source and no additional laser at terminals. Simulation setup is prepared in Opt-system 13 and results show that on the aggregate 100 Gbps downstream transmission and 25 Gbps upstream communications for 10 ONUs can be successfully achieved over a longer bidirectional standard single mode fiber (SSMF). It is also observed that proposed single fiber based bidirectional WDM-PON has lower transmission power losses while ensuring high resilience against Rayleigh backscattering (RB) noise and improved receiver sensitivity in both directions of transmission. (Abstract)
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References


Index Terms

Computer Science

Signal Processing

Keywords
Centralized Light Source; Wavelength Division Multiplexing Passive Optical Network (WDM-PON); Rayleigh Backscattering; Differential Quadrature Phase Shift Keying (DQPSK) Inverse Return-To-Zero (IRZ); Receiver Sensitivity; Optical; communications; Noise mitigation