

Abstract

Moustafa Hussein Aly

Performance Enhancement of Bidirectional TWDM-PON by Rayleigh Backscattering Mitigation

A bidirectional time wavelength division multiplexing-passive optical network (TWDM-PON) with a centralized light source (CLS) is designed and evaluated. TWDM-PON is the promising solution for PON future expansion and migration. The most important issue that limits optical fiber transmission length is the interferometric noise caused by Rayleigh backscattering (RB). In this study, we demonstrate a TWDM-PON architecture with subcarrier at the remote node (RN) to mitigate the RB effect. A successful transmission with 8 optical channels is achieved using wavelength division multiplexing (WDM). Each optical channel is splitted into 8 time slots to achieve TWDM. The proposed scheme is operated over 20 km bidirectional single mode fiber (SMF). The proposed system has the advantage of expanding the downstream (DS) capacity to be 160 Gb/s (8 channels \times 20 Gb/s) and 20 Gb/s (8 channels \times 2.5 Gb/s) for the upstream (US) transmission capacity. This is accomplished by a remarkable bit error rate (BER) and low complexity.