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Abstract

This paper presents Long Reach Wavelength Division Multiplexing Passive Optical Network (WDM-PON) system capable of delivering downstream 20 Gbit/s data and upstream 10 Gbit/s data on a single wavelength. The optical source for downstream data and upstream data is Mode Locked Laser at central office and reflective semiconductor optical amplifier (RSOA) at each optical network unit. We use two RSOAs at each optical network unit for the 10-Gb/s upstream transmission. The operating wavelengths of these RSOAs are separated by the free-spectral range of the cyclic arrayed waveguide gratings used at the central office and remote node (RN) for (de)multiplexing the WDM channels. We extend the maximum reach of this WDM PON to be 45 km by using Erbium-doped fiber amplifiers at the RN. The hybrid amplifier is designed to enhance the signal power and compensated the fiber dispersion over a wide wavelength range. Optical Equalization technique is used before the receiver to improve modulation bandwidth of an RSOA based colorless ONU. Optical Equalization technique helps to improve downlink and uplink performance. Bit error rate measured to demonstrate the proposed scheme. In this paper Long reach and large data service aspects of a WDM-PON is presented.

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Index Terms

Computer Science

Wireless

Keywords

Wavelength division multiplexing passive optical network (WDM-PON) Reflective semiconductor optical amplifier (RSOA)

Erbium doped fiber amplifier (EDFA)

Single mode fiber (SMF)

Photo detector (PD)

arrayed waveguide grating (AWG).