

The WDM–ROF–PON based on linearly-polarization dual-wavelength fiber laser and CSRZ–DPSK modulation

Wei Ji · Qingjie Huang · Dejun Feng · Jun Chang

Received: 17 September 2012 / Accepted: 21 January 2013 / Published online: 1 February 2013
© Springer Science+Business Media New York 2013

Abstract In this paper, we design a linearly-polarized dual-wavelength fiber laser used in WDM–ROF–PON, which can achieve wire-line and wireless access synchronously. With polarization multiplexing, the dual-wavelength fiber laser is the union light source of WDM–PON. With the CSRZ–DPSK modulation, the wireless access system of ONU can save RF source and the frequency of radio carrier can be controlled by OLT. The networking has the credible transmission property, including fiber transmission and wireless access.

Keywords Fiber laser · Linearly polarization · RoF · WDM–PON · CSRZ–DPSK

1 Introduction

With respect to wire-line access networks, the wavelength division multiplexed–passive optical network (WDM–PON) is investigated for its large data bandwidth, enhanced security, and scalability to support several local subscribers. On the other hand, technologies such as Wi-Fi/ WiMAX/3G are becoming popular because they are more scalable and flexible. A real convergence of optical and wireless access may happen in Radio on Fiber (RoF) systems. A new idea about PON/RoF Convergence is to convey the RF sub-carriers on the fiber plant of PON so that the baseband data stream and the data modulated RF signal can be simultaneously delivered to wire-line and wireless users (Lin 2008; Shih et al. 2009).

Erbium-doped fiber laser, especially linearly-polarized one has attracted considerable attention because of their multi-wavelength output, high output power, narrow line-width, and fiber compatibility. They are used in a wide variety of applications, such as wavelength-division-multiplexing (WDM) communications systems, sensing, or microwave photonic generation (Onoda et al. 2008). There are several techniques available to yield a linearly-polarized narrow line-width laser emission. Combination of polarization maintaining (PM)

W. Ji (✉) · Q. Huang · D. Feng · J. Chang
The School of Information Science and Engineering, Shandong University,
Jinan 250100, Shandong, China
e-mail: jiwwww2000@126.com; jiwwww@sdu.edu.cn