ANALYSIS AND TESTING OF A NOVEL OADM BASED ON FBG AND MACH–ZEHNDER INTERFEROMETER

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ABSTRACT: *A novel optical add-drop multiplexer (OADM) based on the Mach–Zehnder interferometer (MZI) and the fiber Bragg grating (FBG) is proposed for the first time to the authors' knowledge. In the structure, the Mach–Zehnder interferometer acts as an optical switch. The principle of the OADM is analyzed in this paper. The OADM can add/drop one of the multi-input channels or pass the channel directly by adjusting the difference of the two arms of the interferometer. The channel isolation is more than 20 dB.* © 2005 Wiley Periodicals, Inc. Microwave Opt Technol Lett 45: 156–158, 2005; Published online in Wiley InterScience (www.interscience.wiley.com). DOI 10.1002/mop.20755

Key words: *OADM; Mach–Zender interferometer; FBG; WDM; switch*

1. INTRODUCTION

Wavelength-division-multiplexing (WDM) is an attractive fiber-optic communications technique because it increases the capacity of the network. The optical add-drop multiplexer (OADM) is a key component of WDM. Many types of OADMs, based on different optical devices, have been reported, such as an arrayed waveguide grating (AWG) [1], a fiber-based MZI with FBGs [2], and optical circulators with an FBG [3, 4]. Among them, the devices that use fiber gratings combined with circulators are promising because they posses a simple structure, their insertion loss and crosstalk are low, and they are polarization insensitive. In these OADMs, the structure using an FBG sandwiched between a pair of three-port optical circulators is the simplest one. However, because the signal at the Bragg wavelength is reflected and then extracted out of the drop port, the structure has no performance of passing the signal. In order to solve this problem, an optical cross-connect is necessary, for example, a mechanical switch [5], an optical microelectromechanical system (MEMS) switch [6], and so forth. In this paper, a novel OADM based on the FBG and the Mach–Zehnder interferometer is proposed. In the structure, the Mach–Zehnder interferometer acts as an optical switch. The principle analysis of the OADM is presented. The testing shows that the channel isolation is more than 20 dB.