

High performance 'Drop and Continue' functionality in a Wavelength Selective Switch

Steven Frisken, Hao Zhou, Dmitri Abakoumov, Glenn Baxter, Simon Poole

Engana Pty Ltd, Locomotive Workshop, Australian Technology Park, Eveleigh, NSW 1430, Australia
steve.frisken@engana.com

Heider Ereifej, Peter Hallemeier,

Optium Corporation Ltd, 500 Horizon Drive, Suite 505 Chalfont, PA 18914

Abstract: We demonstrate for the first time channel-selective optical power sharing between a designated express-port and any drop-port of a 1x9 50 Channel WSS. Bit-Error Rate testing shows that this drop-and-continue functionality can be implemented with negligible system penalty.

© 2006 Optical Society of America

OCIS codes: (060.0060) Fiber optics and optical communications, (060.1810) Couplers, switches and multiplexers

1 Introduction

Although the vision of transparent optical networks was initially inspired by commercially-impractical massive optical fiber switches, the evolution of optical networks to greater flexibility and reconfigurability has been largely enabled by the development of practical optical devices with reconfigurable wavelength selectivity. Initially low port-count devices such as wavelength blockers and 1x2 wavelength selective switches [1] were used, resulting in complicated architectures. The advent of the multi-port wavelength selective switch with integrated dynamic channel power equalization (DCE) and blocking has revolutionized this field. The WSS has been limited in that most switching devices by their nature are not able to arbitrarily distribute the optical power on a per-channel basis between ports.

Recently, compact, full-functionality wavelength selective switches based on Liquid Crystal on Silicon (LCOS) with channel-setting flexibility have been demonstrated [2]. In this paper we demonstrate remote software upgrading of functional performance of a 1x9 50 channel WSS to incorporate a newly developed Channel Power Sharing algorithm. Optical power is share between an express port and an arbitrary drop port for use in drop-and-continue applications

2 LCOS background and principle of operation

The LCOS wavelength selective switch employed relies on a series of optical elements creating an overlapping of the optical intensity profile from each of the ports of an optical fiber array over a very large number of pixels (typically 400) but disperse the wavelengths spatially at the LCOS to allow action on individual wavelengths. The WSS used could be configured as 100x50 GHz channel or 50x100 GHz channels, and in this experiment we used the latter though this was not a fundamental limitation.

We calculated LCOS phase-front "images" which could be applied to any channel after scaling for wavelength and the devices internal calibration. In this case, to split light between two ports we created a ramped phase front modulated by a square wave phase modulation of π . The period of the square wave determined the separation of the two ports about a point determined by the slope of the ramp. Of the

