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Improved Crosstalk Performance in a 10-Wavelength 25 Gbps Multichannel Laser Array Transmitter Module

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Introduction

Multiwavelength laser arrays are an important component for future wavelength division multiplexed (WDM) links and networks [1,2]. The ability to modulate multiple wavelengths simultaneously from a single transmitter provides increased capacity in multichannel links and supports network functions like multicasting, multichannel add/drop, and optoelectronic wavelength conversion. Fully functional transmitters must integrate laser drivers, the laser array, temperature control, DC power distribution and high-speed electronic signal distribution. A critical issue for multiwavelength transmission is electronic, thermal and optical crosstalk within the laser array transmitter [2,3]. In this paper we demonstrate a 10-wavelength multiwavelength transmitter with improved electrical and optical crosstalk performance. Simultaneous modulation of 10 lasers at 2.5 Gbps per channel is demonstrated with low crosstalk resulting in a 25 Gbps data rate into the fiber. The transmitter utilizes the laser array reported in [4] and the laser array driver reported in [5]. Electronic crosstalk is reduced through capacitive decoupling techniques and proper voltage balancing of the laser array common cathode.

Transmitter Configuration

The Bellcore laser array is mounted on a copper submount that is thermally and electrically isolated from the driver structure as shown in Figure 1a. The laser ground pads were wire bonded to the laser submount. The laser submount is cooled with a TEC to the copper block heat sink. Two Rockwell 1x8 laser driver arrays are mounted on copper pedestals thermally connected to the primary heat sink but isolated electrically from the laser array.

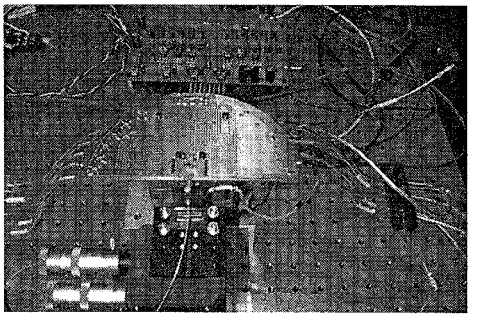

Figure 1a

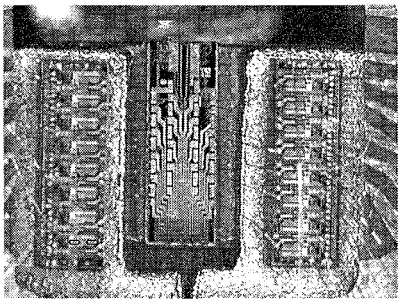

Figure 1b

Results and Summary

The eye diagram for each wavelength is shown with all 10 lasers modulated at 2.5 Gbps 2^{31}-1 PRBS. Channels were detected using a fiber Fabry-Perot and fiber amplifier. The optical spectra shows uniform channel power in Figure 3. The SNR of each eye is limited by our 8 channel source data generator rise time. Figure 4 illustrates that we are not crosstalk limited by showing four channels driven in parallel using a high speed HP 12.5 Gbps BERT. The improved digital signal results in higher SNR and it is expected that driving all 10 channels with these signals

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will improve the eyes in Figure 2. The effect 9 2.5 Gbps channels on a CW channel is shown in Figure 5, illustrating negligible crosstalk.

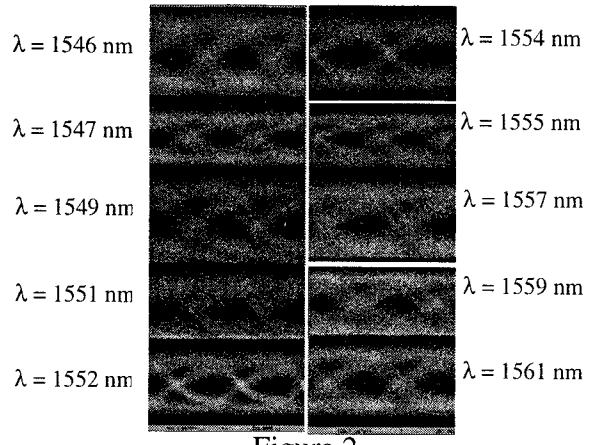

Figure 2

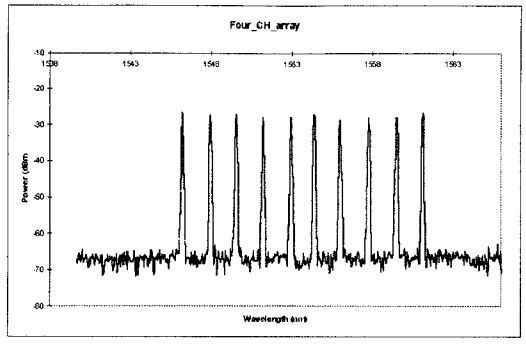

Figure 3

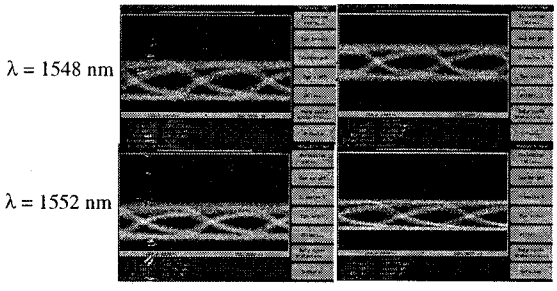

Figure 4

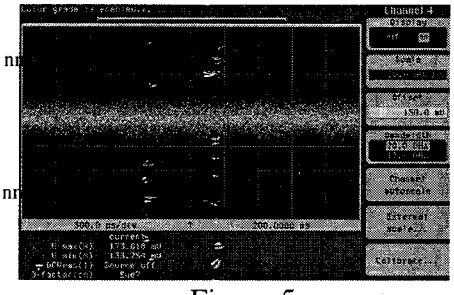

Figure 5

Acknowledgments

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