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EIGHT CHANNEL 5 Gb/s OPTOELECTRONIC TDM

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

An 8:1, 5 Gb/s, time division multiplexer has been implemented using optoelectronic or metal-semiconductor-metal switches for sampling. The device was fabricated on InP and the switches activated via optical fiber delay lines by pulses from a GaAlAs laser diode array. This device concept is applicable to chip and to board level computer multiplexing.

Time division multiplexing (TDM), serializing parallel data for high speed transmission, is an important element in most concepts and implementations in computer networking as well as other areas of communications. An optoelectronic TDM (OE-TDM) approach[1] is advantageous in speed, power, and signal-control isolation. It was conceived initially to offer serial transmission off VLSI chips and recently has shown promise as a stand alone multiplexing technique. We report an improved multiplexer in InP giving an 8:1 multiplex ratio, a 26 dB signal-to-noise ratio, and a 5 Gb/s serial data rate while using a realistic parallel data level of 2 volts instead of the earlier 15 V[1].

The OE-TDM multiplexer concept is shown schematically in Figure 1, where the digital word, e.g. 4 bits are shown, is conducted on parallel metallic lines containing the EO switches. The output from each switch fans into a single high-speed transmission line. The switches are closed (low resistance) sequentially by laser light pulses transmitted with proper delays through optical fibers, serializing the word. The single transmission line carries the serial electrical data to a matched line for further transmission, possibly conversion to fiber optics, and eventual demultiplexing.

The multiplexer featured 8 input lines with bonding pads, 60X60 micron interdigital electrodes with 2 micron fingers and gaps and a 50-ohm coplanar transmission line output. The devices were fabricated by standard semiconductor techniques on semi-insulating InP. A 10-laser diode array was coupled to a 1:8 fiber coupler whose 8 output fibers were trimmed for the proper relative delays, cemented to an etched Si v-groove chip and aligned to the switches. The laser pulses were below 50 ps FWHM and approximately 20 mW peak power at the switches. They are shown detected by a fast PIN photodiode and by an InP switch in Figures 2a and 2b.

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19. ABSTRACT (Continued)

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Eight channel 5 gb/s optoelectronic tdm

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2. REFERENCES

1. D. J. Albares et al, "Optoelectronic Time Division Multiplexing," Electronics Lett., 23(7), 327-328 (1985).

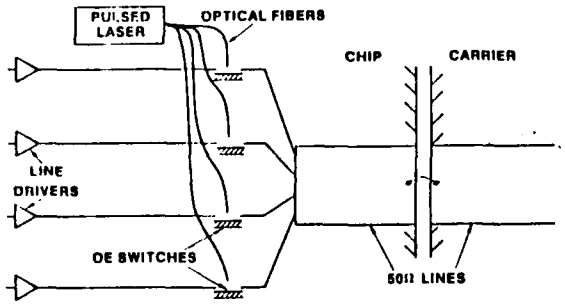

Figure 1. Schematic of OE Multiplexer

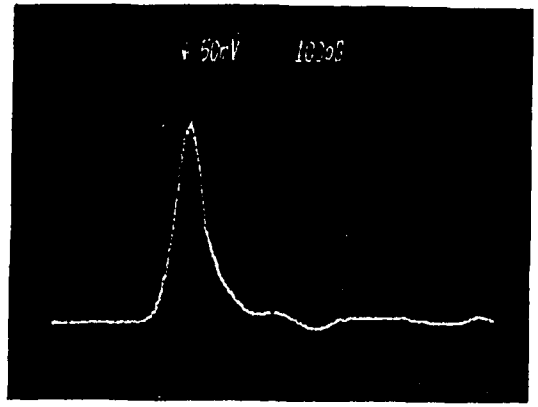

Figure 2a. Laser pulse from diode array detected by PIN diode.

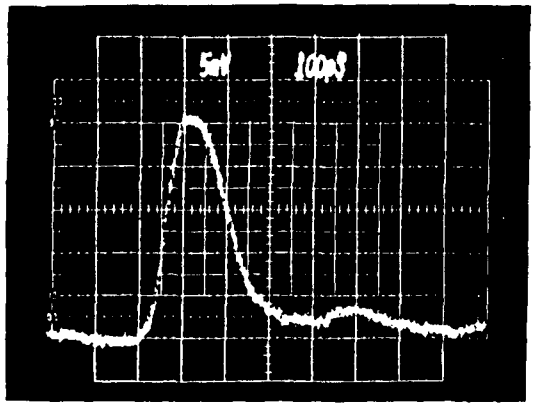

Figure 2b. Electrical pulse from InP switch with 2v bias.

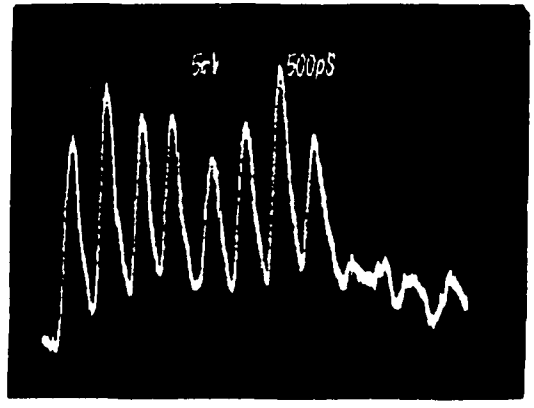

Figure 3. 8:1 Multiplexer output with 2v bias.