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Title: A novel all optical method of implementing an n-bit wavelength encoded complete digital data comparator using nonlinear semiconductor optical amplifiers

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Abstract:Data comparator is the integral part of arithmetic and logical unit of any electronic or optical data processor. Due to some inherent limitations of electronics it cannot be possible to obtain a super fast operation (over terahertz limit) from electronic comparators. Again wavelength encoding technique has been established as an excellent one over other existing optical data encoding techniques. Semiconductor optical amplifier (SOA) technologies have shown their strong potentiality of realizing many all-optical systems. In this communication the authors have proposed a new scheme of developing all-optical wavelength encoded n bit binary comparator exploiting the four-wave mixing, wavelength filtering, wavelength conversion and nonlinear polarization rotation capabilities property of nonlinear semiconductor optical amplifiers. The scheme can be used for comparing signed and unsigned optical binary data of any bit wide numbers as well. The comparator is especially suitable for use as a building block in a larger optical circuit, such as in an all optical telecommunications switch. © 2010 Elsevier GmbH. All rights reserved.