Design and implementation of carry Look ahead generator in reversible logic using nano QCA

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Abstract

The idea of reversible logic is another emerging architecture that has developed its ground in research area. This argument implied zero heat dissipation at the device. According to the physical laws of quantum mechanical effect and the law of coulomb the function and heat relations are satisfied. In this paper, a carry-looking generator is built using reversible logic and its QCA have been reported. To achieve the proposed design use was made of Toffoli and BJN gate. Comparing simulation outcomes to theoretical values verifies the design. The proposed model is tested and simulated using version 2.0.3 of the QCA Designer method.

Keywords: Quantum dot Cellular Automata (QCA); Reversible logic; Toffoli and BJN gate; QCADesigner

1. Introduction

A power consumption is the most difficult field in nano scale logic design. There is a growing need for a new technology that can provide less power dissipation nano size circuits. QCA provides high density applications, low power consumption and high switching speed [1]. Because of these properties quantum gates were targeted for their enabling computational reversibility functions. The computing systems' weakness of heat dissipation is the primary driving force that draws attention to reversibility. Reversible logic preserves the knowledge that is similar to energy and momentum conservation in physics.

The reversibility inherent leads to a new frame function, which results in zero heat dissipation.In QCA reversibility is one to one mapping of output inputs. Landau indicated in 1961 that the loss of one bit of information cost would be greater than the amount of KTln2 energy joules [2]. This indicates the irreversible processes do not maintain information and are loss-making. In addition to the strength of the theoretical definition, some essential interpretation was obtained by Bennet. The bennet clock mechanism achieves less power dissipation than the KTln2 switch Reversibility is a notion that requires bijective action. It indicates both

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