Mahammad Ashraf Ali Beig* et al.
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Topologically-Compressed Energyless Flip-Flop To Reduce Current Dissipation

MAHAMMAD ASHRAF ALI BEIG
M.Tech Student, Dept of ECE
Vidya Jyothi Institute of Engineering & Technology
Ongole, A.P, India

P.OSMAN
Associate Professor, Dept of ECE
Vidya Jyothi Institute of Engineering & Technology
Ongole, A.P, India

Abstract: **The paper proposes a higher speed i.e., a lesser delay TCFF with almost exactly the same power reduction, performance and cell area than the existing TCFF. Therefore the Massive Integration (LSI) makes the main focus because it is the area which needs to be overhauled. TCFF has a reduced transistor count according to logical equivalency. An very low-power switch-flop (FF) named topologically-compressed flip-flop (TCFF) is suggested. Compared to conventional FFs, the FF reduces power dissipation by 75% at % data activity. This power reduction ratio may be the greatest among FFs which have been reported to date. The reduction is achieved by making use of topological compression method, merger of logically equivalent transistors for an unconventional latch structure. The few transistors, only three, linked to clock signal cuts down on the power drastically, and also the smaller sized total transistor count assures exactly the same cell area as conventional FFs. Additionally, fully static full-swing operation helps make the cell loving toward supply current and input slew variation. A brand new approach is conducted, to be able to keep up with the same area and almost same power dissipation when compared with TCFF with a rise in speed. The Modified TCFF promises high-speed operation in which the Clubpenguin-Q delay continues to be reduced considerably associated with any the above mentioned methods. It utilizes a mix coupled logic with several Cascaded stage's in which the logic functions like a Current Mirror Circuit to be able to supply the necessary current needed. An experimental nick design with 40 nm CMOS technology shows that the majority conventional FFs are replaceable with suggested FF while preserving exactly the same system performance and layout area.**

Keywords: **Low Power; High Speed; CPL; Modified TCFF; SIPO;**

I. INTRODUCTION

The LSI's primary component which consumes power may be the FF's. Low Power FF's are among the primary foundations of memory devices, power decrease in FF's can be achieved by taking out the recharge circuit. The TCFF has a new approach which could replace all of the presently used FF's [1]. The paper proposes a higher speed i.e., a lesser delay TCFF with almost exactly the same power reduction, performance and cell area than the existing TCFF. Therefore the Massive Integration (LSI) makes the main focus because it is the area which needs to be overhauled. TCFF has a reduced transistor count according to logical equivalency. The circuit includes no dynamic or pre-charge circuits, therefore it avoids additional power wastage. TCFF may be the latest emerging technology within the low power FF's, it may supersede all of the conventional ones. It cuts down on power while keeping the performance and area. It uses only 3 clock-given transistors, that is a much lesser count than other FF's, thus helps it to dissipate less power functioning. VD1 and VD2 are opened up to power level and also the input data (D) is kept in the actual latch. When Clubpenguin is high, the PMOS linked to Clubpenguin turns off, the NMOS linked to Clubpenguin activates, and also the slave latch becomes the information output mode. CPL style can be used to lower the delay having a marginal rise in the typical power. CPL is usually utilized in high-speed operation. CPL style can be used to lower the delay having a marginal rise in the typical power. CPL is usually utilized in high-speed operation [2]. A brand new approach is conducted, to be able to keep up with the same area and almost same power dissipation when compared with TCFF with a rise in speed. The Modified TCFF promises high-speed operation in which the Clubpenguin-Q delay continues to be reduced considerably associated with any the above mentioned methods. It utilizes a mix coupled logic with several Cascaded stage's in which the logic functions like a Current Mirror Circuit to be able to supply the necessary current needed. After simulation and analysis of Modified TCFF, it shows 97% less delay than TCFF.

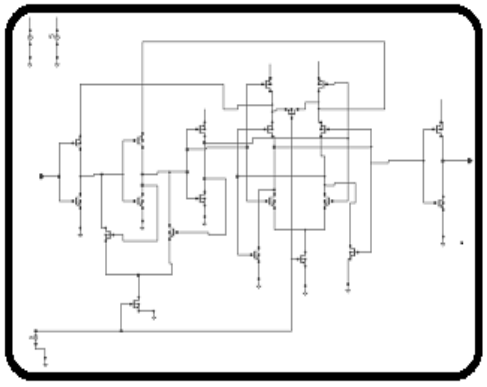

Fig.1.Schematic diagram

II. METHODOLOGY

The Modified TCFF has had and implemented using TFF, SRFF, JKFF by analyzing the typical power, Clubpenguin-Q delay, PDP (Power Delay Product) [3]. The DFF can be used out of all following implementations of FF's below. Rather of conventional DFF we're using modified TCFF. The T switch flop was created using XOR (Exclusive-OR) gate and D switch flop. The characteristic equation of D switch flop is offered as D=TQb TbQ. The creation of XOR gate is offered as input towards the N2 transistor of DFF. The XOR gate was created with using PTL (Pass Transistor Logic) technique. The SR switch flop was created utilizing a SR block and D switch flop. The characteristic equation of SR switch flop is offered as D=S RbQ . The SR block was created using static CMOS techniques [4]. The JKFF was created utilizing a multiplexer along with a D switch flop. The characteristic equation of D switch flop is offered as D=JQb KbQ. The creation of the multiplexer is given as input towards the D switch flop. The multiplexer was created using NMOS transistor logic. A register is several switch flops. A FF stores 1-little bit of data, here 4 FF's are utilized to create a SIPO shift register which could store 4-items of data. SIPO shift register shifts the information into self storage units and all sorts of self storage units can be found as outputs. Similarly, it converts data from serial format to parallel format. If 4 data bits are shifted by 4 clock pulses using a single wire at data-in, the information opens up concurrently around the 4 outputs, Q1 to Q4 following the fourth clock pulse. The sensible use of the SIPO shift register would be to convert data from serial form on one wire to parallel form on multiple wires. The simulations were transported by helping cover their 45nm (nanometer) technology in Pedal rotation Virtuoso tool. The performance parameters of TCFF, TCFF with CPL logic style and Modified TCFF rich in speed were compared and analyzed. Same transistor dimensions are provided to each transistors utilized in the circuit design to simulate in same atmosphere conditions [5] [6]. The delay is decreased extremely both in modifications. The region barely continues to be same and also the power is marginally elevated.

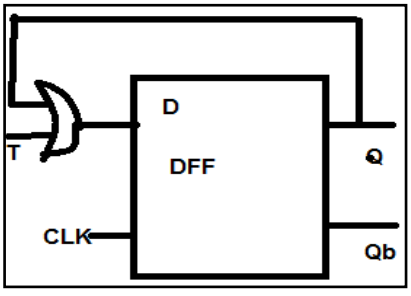

Fig.2.Block diagram of TFF

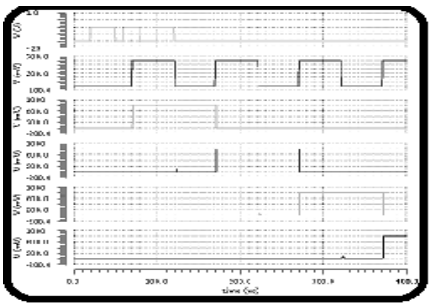

Fig.3.SIPO wave form

III. CONCLUSION

The paper introduces a brand new structure of TCFF, viz., Modified TCFF having a significant reduction in the delay when compared to original TCFF. TCFF outperforms every other FF's in first and foremost parameters. The paper proposes a higher speed i.e., a lesser delay TCFF with almost exactly the same power reduction, performance and cell area than the existing TCFF. Therefore the Massive Integration (LSI) makes the main focus because it is the area which needs to be overhauled. TCFF has a reduced transistor count according to logical equivalency. With this particular new method it achieves our prime speed advantage too. The region is also marginally same. A brand new approach is conducted, to be able to keep up with the same area and almost same power dissipation when compared with TCFF with a rise in speed. The Modified TCFF promises high-speed operation in which the Clubpenguin-Q delay continues to be reduced considerably associated with any the above mentioned methods. It utilizes a mix coupled logic with several Cascaded stage's in which the logic functions like a Current Mirror Circuit to be able to supply the necessary current needed. Therefore, it may be broadly employed for high-speed applications with low power wastage.

IV. REFERENCES

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