

In the design of any ALU, shift registers are generally used to perform addition (for carry movement), multiplication and for any floating point arithmetic. The shift registers currently used are made up of flip-flops which require n clock pulses for n shifts which can increase the delay. So, the aim is to design a high speed shift register i.e., barrel shifter which needs a single clock pulse for n shifts. In this paper, three types of Barrel shifter circuits called left rotator, right rotator and bidirectional rotators are designed using universal gates (conventional model) and transmission gates. Compared to conventional model, barrel shifter designs with transmission gates in 180nm and 45nm require less power and area with reduced delay. The final circuit of barrel shifter using conventional design requires 192 transistors with more power consumption, whereas transmission gate based barrel shifter circuits for all shifter operations require a total of 72 transistors, so that the area is reduced by 62.5%. Compared to conventional design and 180nm technology, MUX designs and various barrel shifter circuits(left shifter ,right rotator and bidirectional circuits) in 45nm require less power i.e., in nW . When the delay is considered 180nm model has lowest delay. The designed barrel shifter circuits are showing improved performance than conventional models already presented in the literature.