

## Very Large Scale Integration Architecture of Finite Impulse Response Filter Implementation Using Retiming Technique

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**Abstract :** Recursive combination of an algorithm based on Karatsuba multiplication is exploited to design a generalized transpose and parallel Finite Impulse Response (FIR) Filter. Mid-range Karatsuba multiplication and Carry Save adder based on Karatsuba multiplication reduce time complexity for higher order multiplication implemented up to n-bit. As a result, we design modified N-tap Transpose and Parallel Symmetric FIR Filter Structure using Karatsuba algorithm. The mathematical formulation of the FFA Filter is derived. The proposed architecture involves significantly less area delay product (APD) than the existing block implementation. By adopting retiming technique, hardware cost is reduced further. The filter architecture is designed by using 90 nm technology library and is implemented by using cadence EDA Tool. The synthesized result shows better performance for different word length and block size. The design achieves switching activity reduction and low power consumption by applying with and without retiming for different combination of the circuit. The proposed structure achieves more than a half of the power reduction by adopting with and without retiming techniques compared to the earlier design structure. As a proof of the concept for block size 16 and filter length 64 for CKA method, it achieves a 51% as well as 70% less power by applying retiming technique, and for CSA method it achieves a 57% as well as 77% less power by applying retiming technique compared to the previously proposed design.

**Keywords :** carry save adder Karatsuba multiplication, mid range Karatsuba multiplication, modified FFA and transposed filter, retiming

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