

## Design of an Efficient Retimed CIC Compensation Filter

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**Abstract :** Unwanted side effects because of spectral aliasing and spectral imaging during signal processing would be the major concern over the sampling rate alteration. Multirate-multistage implementation of digital filter could come about a large computational saving than single rate filter suitable for sample rate conversion. This implementation can further improved through high-level architectural transformation in circuit level. Reallocating registers and relocating flip-flops across logic gates through retiming certainly a prominent sequential transformation technology that optimize hardware circuits to achieve faster clocking speed without affecting the functionality. In this paper, we proposed an efficient compensated cascade Integrator comb (CIC) decimation filter structure that analyze the consequence of filter order variation which has a retimed FIR filter being compensator while using the cutset retiming technique and achieved an improvement in the passband droop by 14% to 39%, in computation time by 38.04%, 25.78%, 12.21%, 6.69% and 4.44% and reduction in path delay by 62.27%, 72%, 86.63%, 91.56% and 94.42% of 3, 6, 8, 12 and 24 order filter respectively than the non-retimed CIC compensation filter.

**Keywords :** Multirate Filtering, CIC decimation filter, Compensation theory, Retiming, Retiming algorithm, Filter order, Synchronous dataflow graph.

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