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Abstract
This paper proposes a design method of Orthogonality Frequency Division Multiplex（OFDM）for Communication Systems. The IFFT/FFT modulator/demodulator can be used to implement the structure of OFDM. Besides, the advantage of OFDM is that ISI (Inter Symbol Interference) and ICI (Inter Carrier Interference) effects can be reduced.

In this paper, a programmable OFDM (Orthogonal Frequency Division Multiplex) is implemented based on the FFT architecture. DIF (Decimation In Frequency) FFT algorithm of Coolay-Tukey Radix-2 and Radix-2/4/8 with MDC (Multi-path Delay Commutator) and SDF (Single-path Delay Feedback) pipeline hardware architecture are employed in the FFT processor. The size of FFT is programmable in the range of 2n, where n is described as from 6 to 13. In addition, the required lengths of the data and coefficient are also analyzed to optimal the hardware design. Two design examples including a fixed 64 point Radix-2 MDC OFDM and a programmable Radix-2/4/8 OFDM with FFT size of 64 and 128 are presented..

In this paper, we have also presented a SoC platform and Soft IP architecture to design OFDM, and provided a easier programmable and reusable chip design. Therefore, the proposed design methods are suitable for the SoC applications and they can reduce the developed time in the SoC products.
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