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DESIGN OF A LOW DENSITY PARITY CHECK ITERATIVE DECODER BASED OFDM FOR OPTICAL COMMUNICATION

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Abstract

Orthogonal frequency division multiplexing (OFDM) is used in many broadband wired and wireless communication systems but until recently has not been used in optical communications. Recent research has shown that OFDM can be applied to many optical communication systems, including both single mode and multimode optical fiber applications and optical wireless systems. This paper investigates a Low-Density Parity-Check (LDPC) coded Orthogonal Frequency-Division Multiplexing (OFDM) optical communication system based on IEEE 802.11a standard. This paper studies low-complexity high-speed decoder architectures for quasi-cyclic low density parity check (QC-LDPC) codes. Algorithmic transformation and architectural level optimization are incorporated to reduce the critical path and bit error rate (BER). Enhanced partially parallel decoding architectures are proposed to linearly increase the throughput of conventional partially parallel decoders through introducing a small percentage of extra hardware. Simulation results show that this algorithm is effective and the decoding performance is satisfied when maximum iteration number is 10. Several power efficient OFDM schemes and LDPC codes suitable for use in LDPC coded OFDM optical communication systems are introduced.

Keywords: IEEE 802.11a standard; LDPC coded, quasi-cyclic (QC) codes. Modulation; OFDM system; decoding initialization algorithm