OFDM-Aided Differential Space–Time Shift Keying Using Iterative Soft Multiple-Symbol Differential Sphere Decoding

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Abstract

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Abstract:
Soft-decision multiple-symbol differential sphere decoding (MSDSD) is proposed for orthogonal frequency-division multiplexing (OFDM)-aided differential space–time shift keying (DSTSK)-aided transmission over frequency-selective channels. Specifically, the DSTSK signaling blocks are generated by the channel-encoded source information and the space–time (ST) blocks are appropriately mapped to a number of OFDM subcarriers. After OFDM demodulation, the DSTSK signal is noncoherently detected by our soft-decision MSDSD detector. A novel soft-decision MSDSD detector is designed, and the associated decision rule is derived for the DSTSK scheme. Our simulation results demonstrate that an SNR reduction of 2 dB is achieved by the proposed scheme using an MSDSD window size of $N_w = 4$ over the conventional soft-decision-aided differential detection benchmarker, while communicating over dispersive channels and dispensing with channel estimation (CE).

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