A Programmable Lattice-Reduction Aided Detector for MIMO-OFDMA

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Abstract: This paper presents the first programmable LatticeReduction Aided (LRA) symbol detector for Multiple-Input Multiple-Output (MIMO) and Orthogonal Frequency Division Multiple Access (OFDMA). The detector proposed is implemented using 65 nm ASIC technologies. Owing to the programmability, the detector can be dynamically switched between linear (e.g. MMSE) and lattice-reduction aided (e.g. LRA-MMSE) detectors by simply running another software subroutine. Therefore, it allows a good trade-off between performance and computational latency to be achieved under various scenarios. Along with the hardware, two algorithm simplifications (SCNT-LR and SOT-LR) are proposed for finding subcarriers with illconditioned channel matrices. And in the end, interpolated LR (ILR) is proposed to further reduce the computational complexity for real-time implementations.