

Part I

Point to Point MIMO

In MIMO systems, the joint detection can be performed by the ML detector to obtain optimal performance. However, since its complexity grows exponentially with the number of transmit antennas, this detection method may not be used in practical systems. To avoid prohibitively high complexity, computationally efficient suboptimal MIMO detection methods are investigated, including the MMSE and ZF detectors which take the signals from other antennas as the interference. Although it shows that they have almost the lowest complexity, they cannot provide satisfactory performance, especially at a high SNR. Therefore, to find a detector that has the same complexity as that of the linear detectors, while providing the ML performance poses a big challenge in recent MIMO research.

In this part, we present different computationally efficient algorithms with reasonably good performance for point to point MIMO detection, where two key ingredients are considered to develop these methods: list decoding and lattice reduction.