

# Massive MIMO in Fixed-Point Arithmetic

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**Abstract**—Massive MIMO base stations are expensive to build due to the requirement for a large number of RF transceivers and high-resolution analog-to-digital converters. A way to reduce the implementation cost is to build the base stations with inexpensive hardware, resulting in the received signals to be coarsely quantized. To implement the data detection and decoding process in real time, fixed-point arithmetic with reduced precision is used. This article reports the minimum wordlength needed to maintain the Bit-Error Rate (BER) at acceptable levels. Specifically, the eigenvalue decomposition, which is the most computationally demanding portion of the receiver algorithm, can be calculated with wordlengths of 7 and 10 bits for eigenvectors and eigenvalues, respectively.

**Keyword**—Massive MIMO, fixed-point arithmetic.



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