1 Relation to Compressed Sensing

1.1 Overview of Compressed Sensing

1.1.1 Compressed Sensing Formulation

$$\vec{x} = \mathbf{\Phi}\vec{y} \tag{1.1}$$

$$\vec{x} = \mathbf{\Phi}\mathbf{\Psi}\vec{\theta}$$

(1.2)

1.1.2 Conditions for successful Parameter Estimation

1.2 Coherence and Sidelobe Level

1.3 The Compressed Sensing Model for MC-MIMO

The sparse MC-MIMO antenna array can be related to compressed sensing. The received signal from the sparse array represents the compressed signal $\vec{x}$, while the dense signal $\vec{y}$ from eq. 1.1 is equivalent to the signal retrieved from a "dense" grid of available antenna positions.

Eq. 1.1 also describes the relation between this grid of antenna positions, in which we distribute a small number of antennas to arrive at the sparse antenna geometry. The selection matrix $\mathbf{\Phi}$ is simply a matrix compiled of the rows of an identity matrix. The rows that are selected equate to the potential antenna positions where an actual antenna is placed.

1.3.1 The Sparse Parameter Space

1.3.2 Vectorizing Signal and Parameter Space

1.3.3 The Sensing Matrix

1.4 Analysis of the Compressed Sensing Model for MC-MIMO