

Space Shift Keying Modulation for MIMO Systems

Ali Ghrayeb, ECE Department, Concordia University, Montreal, Canada
(aghrayeb@ece.concordia.ca)

NOTE: This work has been submitted to IEEE Transactions on Wireless Communications for possible publication. It has been done jointly with my MSc student Jeyadeepan Jeganathan and Prof. Leszek Szczecinski of INRS-EMT, Montreal, Canada.

Abstract

In this seminar, we introduce a modulation scheme, termed space shift keying (SSK), suitable for multiple-input multiple-output (MIMO) systems. SSK modulation, which is a fundamental component of spatial modulation, inherently exploits fading in wireless communications to provide better performance over conventional amplitude/phase modulation (APM) techniques. In SSK, *only* the antenna indices, and not the symbols themselves (as in the case of SM and APM), relay information. We illustrate SSK's strength by studying its interaction with the fading channel. We obtain tight upper bounds on uncoded bit error probability, and analytically demonstrate coded SSK's diversity advantage over APM. Capacity results are presented, with SSK gaining as much as 1 bit/s/Hz over APM techniques. Analytical and simulation results show performance gains (2-8 dB) over popular multiple antenna APM systems (including Bell Laboratories layered space time (BLAST) and maximum ratio combining (MRC) schemes), making SSK an excellent candidate for future wireless applications.