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# Performance of Multiple Antenna Beamforming in Higher Constellation PSK Signaling Schemes

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**Abstract**—The quality of reception of radio signals at the destination is greatly influenced by the type of signaling schemes used and the use of multiple antennas at the output of transmitter and the input of receiver. However, this configuration usually causes InterCarrier Interference (ICI), which leads to distortions. In this paper, the performance of 6×6 multiple antenna beamforming in offset 16, 32 and 64-Phase Shift Keying (PSK) schemes is evaluated using the system model for the received signal developed to reduce distortions. The beamforming is performed on the offset signaling schemes by weighing the transmitted streams with the eigenvalues of the 6×6 antenna channel before the transmission through the 6 multiple antennas over the Rayleigh channel. The distorted signals received are demodulated and filtered by using the square root raised cosine receive filter. These signals are detected and compared with the transmitted bits to evaluate the performance using Bit Error Rate (BER). The results obtained show that as the constellation size of offset PSK schemes increases, the BER values increase and provide better performance than the corresponding conventional schemes.

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## 1. INTRODUCTION

The multiple antenna configuration is a technique for increasing the capacity, quality of service, performance and for reducing the interference of any form from other users. The multiple antennas are employed to reduce effects of the scattering by obstacles along the signal propagation that results in fading. Signal propagation through the wireless channel experiences the loss of signal strength and shadowing due to obstacles resulting in multipath propagation.

Though diversity combining techniques such as Maximal Ratio Combining (MRC), Selection Combining (SC), and Equal Gain Combining (EGC) have made enormous contributions in enhancing the performance of wireless communication system leading to the growth of wireless technology, but they are less efficient in higher data rate systems [1–4].

However, due to the need of high data rates, spectral efficiency and better performance, the research into the multiple antenna technology is being carried out for achieving these features [5].

Some of the techniques under multiple antenna technology are Multiple Input Multiple Output (MIMO), where there are equal arrays of antennas at both transmitting and receiving ends of the wireless channel, Single Input Multiple Output (SIMO), where there are multiple antennas at the input of receiver with only one transmitting antenna; and the other possible technique is Multiple Input Single Output (MISO), where many antennas are transmitting over the wireless channel to one receiving antenna.

According to [6, 7] research has shown that an increase in channel capacity is noticeable when multiple antennas are used at the input and output of the channel. The link performance and gain of MIMO are maximized when the channels between transmit and receive antennas are assumed to be independent of one another due to multipath propagation. Independent of paths means, the propagation paths are uncorrelated.

Based on the diversity or multiplexing technique, MIMO transmission schemes are classified as beamforming, spatial diversity, and spatial multiplexing [8–12].

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

## ADDITIONAL INFORMATION

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