

## ABSTRACT

Advanced wireless technology to support high reliability and low complexity needed along with accelerated development of technology information and communication. Nowadays researchers and industry have started preparing the world by developing Massive MIMO technology that can support the evolution of 4G to 5G. There are some studies that discussed several techniques to overcome problems in communication systems with high reliability. One of the techniques required in massive MIMO implementation is proper space time coding. In the era of 4G, space time block code developed rapidly with two kinds of orthogonal schemes that are categorized into two groups: orthogonal and orthogonal quasi. Orthogonal space time block code that can only be used in simple modulation, with quasi orthogonal space time block code modulation complex can be applied and orthogonality value generated by QOSTBC will be higher than OSTBC so as to increase the reliability of the data. In previous research has been proposed QOSTBC using MC-CDMA as multicarrier, result of this system still has orthogonal which is less stable causing decrease of system performance

This research will be proposed a MIMO system scheme which is an improvement of QOSTBC that used a transmission diversity technique. Full diversity in this technique will occur if multiple symbols are transmitted into two transmitting parts that are transmitted at different time slots. This improvement from QOSTBC is Twice QOSTBC uses a provision in two codeword matrices to be sent are arranged diagonally so as to have higher levels of orthogonality. The detection also involves nonlinear processing, which further complicates the system. To solve these problems, we propose a zero forcing EVCM which eliminates the system complexity. In this case Twice QOSTBC highly structured (4x1) can be replaced as an equivalent EVCM channel H.

From the simulation results when used 4 pieces antenna at the transmitter the proposed results outperform other QOSTBC techniques with a difference around 3 dB for  $10^{-6}$  BER. We can concluded that in general the proposed system maintained a better performance compared to other Space Time Coding scheme because the data is transmitted through two symbols at once which is repeated with the second codeword and the effect of diagonal matrices at the transmitter can fully the orthogonality of scheme. The decoder ZF EVCM has a very similar structure as the code matrix S of the underlying Twice QOSTBC which can eliminates the system complexity.

**Keywords:** Twice QOSTBC, MC CDMA, ZF EVCM