

ABSTRACT

Multi User MIMO (MU-MIMO) is known as extended from Space Division Multiple Access (SDMA) which can afford transmitter with multiple antennas which make a group of MIMO users. They can share frequency and time resource in same time. MU-MIMO can increase the capacity significantly than single user MIMO (SU-MIMO). But, MU-MIMO make multi user interference (MUI) problem. So we need to precoding signal before the signal is transmitted to suppress MUI. Linear precoding has advantage in low complexity computation, but the capacity is smaller than non linear model. One method of linear precoding is Block Diagonalization (BD). BD has higher capacity than *Zero Forcing (ZF)* dan *Minimum Mean Square Error (MMSE)* when users are implemented with multiple antennas.

In this final project, BD precoding is simulated in MU-MIMO 3GPP LTE Rel.10 downlink. The first scenario is simulated with different BD configurations for knowing the characteristics of every BD configurations. Then, the system is simulated with comparing BD performance in rayleigh and rician channel for knowing BD characteristics in a certain channel. The last simulations is comparing BD with other linear precoding, MMSE, for knowing the robustness of BD than other precoding scheme. The used parameters to see performance is SNR and BER. All of simulation use MATLAB R.2012 software.

The result of simulation can be shown that BD can suppress MUI until 10^{-15} times. In consequences, ignore the noise effect. When the number of antennas in transmitter are fixed, performance of BD SNR is better approximately 1-2 dB with increasing the number of receive antennas in user. When the number of receive antennas in user are fixed, performance of BD SNR is better approximately 2-3dB with decreasing the number of transmitted antennas. Performance of BD is better when implemented in rayleigh channel than rician channel too. The result is shown that *i.i.d rayleigh* is better 3.46 dB than rician $K=2.2$ dB and 7.02 dB than rician $K=6.9$ dB in term of SNR. When comparing with MMSE, performance of BD still far from good with difference of SNR is 15.03 dB in BER target 10^{-3} .

Keyword : MU-MIMO, Block Diagonalization, MMSE, Precoding, MUI.