TELKOM UNIVERSITY

Abstract

SCHOOL OF ELECTRICAL
The Graduate School

Master of Engineering

Modeling Massive MIMO Transceiver Antenna for Full-Duplex Single-Channel System (In Case the Impact of Self Interference)

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The increasing demand for mobile data is not compensated with the availability of frequencies because it is not renewable. Massive MIMO technology offers significant increases in capacity, data rate, and link reliability without additional bandwidth or transmission power. Research on Massive MIMO has been done with various schemes. From previous studies Massive MIMO is modeled in cylindrical and linear shape. Massive MIMO system modeled in previous study use low frequency at 2.6 GHz. This frequency is not suitable for future broadband technology because in the era of broadband IOT devices will use high frequency and possible coverage of cell would be smaller. The Massive MIMO transciever antenna model was introduced in this study. The antenna model implemented use high frequency at 60 GHz that provides broadband wireless communication which gives high capacity, high data rate and wide bandwidth. Configuration of antenna has been set to eliminate the mutual coupling effect. The system utilize full duplex single (FDSC) which is the same frequency and time used to transmit and receive data. In FDSC bandwidth can be minimized but the effect of self interference is appeared and it will simulate and analyze. The effect of self interference for Massive MIMO transceiver antenna simulated from 10% to 100%. In this study the number of antena is 64×64 in one node. The number of antenna is exploited to increase capacity. All of the antenna as receiver are functioned to get redudancies and 32 antennas as transmitter adjusted to the required capacity.

From results simulation the Massive MIMO model have 20% tolerance of self interference effect. The purpose system MIMO 32x64 provides the channel capacitys $\approx$ 390 bit/s/Hz.This system provide $\approx$ 39 fold spectral efficiency. The acceptable tolerance of self interference results 20% decreased of channel capacity.