ABSTRACT

Communication has taken a vital part in modern human life nowadays. Cellular telecommunication development is also directed to fulfill the need of multimedia transfer, ease of access, and reliable multimedia transfer communication. Cellular communication system has developed and now is reaching the 4^{th} generation (4G) which is Long Term Evolution (LTE). According to 3GPP, LTE is able to support user's mobility starting from 0 km/hr until 120 km/hr. The problem is, supporting user's mobility is also making the propagation channel time-varying which can cause performance degradation.

The problem can be solved by doing adaptation of modulation and coding scheme or adaptive modulation and coding (AMC) which is used to enhance system performance. Research is done in LTE system and uses an adaptive modulation and coding technique in a system which uses MIMO OFDM and SFBC scheme on downlink. LTE system which is used is LTE release 8 with 3 MHz bandwidth, 256 subcarriers, QPSK, 16QAM, and 64QAM mapper, and convolutional code with ½ and $^1/_3$ code rate. Channel which is used is using Rayleigh model and AWGN noise model. System is simulated and analyzed on several conditions; from a static (0 km/hr) user condition and moving user starting from 3 km/hr until 120 km/hr. Performance's parameter is shown by BER-to-SNR curve.

Simulation results using AMC technique is able to enhance LTE rel 8 system's performances, which are showed in a better BER value in comparison to the conventional LTE rel 8 system, for each user's velocity. AMC usage with given *threshold* 6 dB, 11 dB, 12 dB, 17.5 dB, and 19 dB gives system a performance for BER 10^{-5} in SNR range 5 dB to 12 dB and 14 dB to 20 dB for v = 3 km/hr; given *threshold* 6 dB, 9 dB, 12 dB, 16 dB, and 19 dB gives BER 10^{-5} on SNR range 5.5 dB to 8 dB and 11.5 dB to 12.5 dB for v = 30 km/hr, and for performance using v = 120 km/hr, BER under 10^{-3} is achieved in SNR range from 4 dB to 15.8 dB.

Keywords: LTE rel 8, MIMO, SFBC, AMC, BER, SNR