ABSTRACT

The use of a frequency spectrum by a primary user (PU) is sometimes not used in its entirety from the existing frequency spectrum so there is inefficient use of the frequency spectrum, meanwhile there are some unlicensed users (SU) want to use that frequency spectrum. Cognitive radio helps SU to be able to use and utilize the inefficiencies of frequency spectrum.

A cognitive radio system is an intelligent system that can detect the frequency spectrum that is being used or unused or can adjust to the surrounding circumstances. In this case, the cognitive radio system used is a spectrum underlay that allows the secondary user to access the frequency spectrum of the primary user (PU) with the power level of the secondary user (SU) not exceeding the primary user's power level and does not interfere with the performance of the primary user (PU). With the power level of the secondary user lower than primary user's power level and the interference that arises between PU and SU cause the performance generated by secondary user decreases. in order to keep the quality of each user optimum, especially SU, we use multiuser detection to minimize the interference, which is by using Successive Interference Cancellation (SIC). Furthermore, the MC-CDMA system are required to model the multiaccess systems on cognitive radio systems.

From the simulation results obtained that 16-QAM modulation has a greater improvement than QPSK modulation. The 16-QAM modulation resulted in a 4-5 dB improvement on SNR ≈28 dB when it reached BER 0.001, while QPSK modulation only resulted in SNR improvement of 2-3 dB at SNR ≈ 22 dB when it reached BER 0.001. The cognitive radio system when the SU power is only 20% of PU power, the resulting SU performance gets a 3 dB SNR improvement at SNR ≈ 34 dB when it reached BER 0.001. Radio cognitive system with variable SU speed and constant PU at 3 km / h and BER 0.001, SU performance produces 4-5 dB improvement. Radio cognitive system with variable SU speed and constant PU at 60 km / h and BER 0.001, SU performance produces a 9 dB improvement at SU speed 3 km / h, 2 dB at SU speed 60 km / h, and 5 dB at speed SU 120 km / h. Radio cognitive system with variable SU speed and constant PU at 120 km / h and BER 0.001, SU performance produces a 9 dB improvement at SU speed 3 km / h, 2 dB at SU speed 60 km / h, and 5 dB at speed SU 120 km / h.

Keywords: Cognitive Radio, Successive Interference Cancellation (SIC), MC-CDMA