

ABSTRACT

This research conducts measurements using USRP to analyze communication systems in indoor and outdoor conditions based on Software Defined Radio (SDR). Multipath fading can damage or disrupt the transmitted data so that it cannot be received perfectly by the receiver. This research discusses data transmission using Multicarrier Orthogonal Frequency Division Multiplexing (OFDM) technology. OFDM is an efficient modulation technique in utilizing bandwidth and overcoming the effects of multipath fading. This research analyzes the performance of text-based data transmission under multipath fading conditions by generating Signal to Noise Ratio (SNR), Bit Error Rate (BER), and Complementary Cumulative Distribution Function (CCDF) curves. The simulation uses Universal Software Radio Peripheral (USRP) and RTL-SDR devices with the help of GNU Radio and Matlab software. This research shows that OFDM technology is able to improve the quality of data transmission in multipath fading conditions, with the highest SNR value achieved in this research is 16.3975 dB with the lowest BER of $10^{-0.352543}$ which results in a percentage of received data of 89.03% in the test environment in outdoor conditions. Meanwhile, the lowest SNR value in this study is 7.18475 dB with the lowest BER value of $10^{-0.359288}$, which results in a percentage of received data of 75.74% under indoor conditions. An increase in SNR value contributes to a decrease in BER value, which indicates that the transmission quality improves with more minimal multipath fading conditions. A higher SNR value indicates less interference, which results in a lower bit error rate and a higher percentage of received data.

Keywords: BER, CCDF, multipath fading, OFDM, SNR, Software Defined Radio.