

ABSTRACT

This research is focused on improving road safety for drivers in Indonesia, in light of the high incidence of accidents and fatalities each year, particularly among motorcyclists and car drivers. This research develops a vehicle communication system using SDR to support a Smart Transportation System, utilizing HackRF SDR, an omni RP-SMA male antenna, and GNU Radio software with BPSK modulation. The system was tested to ensure that all functions and features operate optimally. The testing was conducted over 21 days using the most effective frequencies. The frequency test results revealed that the device could not operate at frequencies from 5,9 GHz to 3,1 GHz. However, the device performed effectively at frequencies from 3 GHz to 2,7 GHz with a maximum range of 45 meters. Quality of Service (QoS) testing results showed an average Bit Error Rate (BER) of 0.34356 on straight roads, 0.3458 at intersections with obstacles, and 0.344 at intersections without obstacles. The average Signal-to-Noise Ratio (SNR) was -3.494 dB on straight roads, -3.453 dBm at intersections with obstacles, and -3.485 dB at intersections without obstacles. Packet loss averaged 31.22% on straight roads, 14.19% at intersections with obstacles, and 8.46% at intersections without obstacles. Spectrum testing at distances from 5 meters to 15 meters showed an average power level of -50.75 dBm

Keywords: *Accidents, Vehicle Communication, HackRF SDR, BPSK, QoS.*