ABSTRACT

The use of 5G technology can increase efficiency and automation in various aspects of agriculture, especially in Nganjuk Regency in terms of fast and real-time communication between devices and agricultural machinery. However, 5G signal coverage in Nganjuk is not yet available, to support the development of smart garden. This research designs a 5G network based on the region using a frequency of 2.3 Gigahertz (GHz) for the Nganjuk Regency area with an area of 1,224 Km2. The analysis in this study pays attention to the results of simulation performance based on the frequency of 2.3 GHz, UMA propagation and NLOS conditions according to the 3GPP 38.901 standard. This research includes four uplink and downlink scenarios in Outdoor to Outdoor (O2O) and Outdooor to Indoor (O2I) schemes. The simulation results show that the number of sites for downlink is more than for uplink. Where the sites in the O2O uplink scenario are 602, scenario 2 uplink O2I are 702, scenario 3 downlink O2O are 1,299, and scenario 4 downlink O2I are 1,515. Two main parameters, SS-RSRP and SS-SINR, are analyzed based on the simulation results. Under NLOS conditions, the SS-RSRP parameter shows the highest value in the O2I downlink scenario with an average of -69.01 dBm in the "Good" category, while the lowest value is recorded in the O2O uplink scenario with an average of -90.23 dBm in the "Normal" category. For the SS-SINR parameter, the highest value was recorded in the O2I uplink scenario with an average of 10.33 dB in the "Normal" category. While the lowest value was recorded in the O2I downlink scenario with an average of 0.72 dB, falling into the "Normal" category. These results indicate that the O2I downlink scenario requires many sites, but provides better SS-RSRP signal quality.

Keywords: *Coverage planning, 5G network, 2.3 GHz frequency, Non-Line of sight (NLOS), Urban Macro (UMa) Propagation*