

ABSTRACT

This thesis proposes (i) 5G Telkom University channel model simulated in Telkom University campus, Bandung, Indonesia, (ii) a framework to calculate and validate the channel model and its performance by using a real-field parameters of any locations in Indonesia, the 5G Indonesia channel model of several cities in Indonesia is derived based on the proposed framework.

5G Telkom University channel model is represented by the power delay profile (PDP) taken from a series of computer simulation by considering a real-field parameters of environments in Telkom University. This thesis also calculates the 5G Indonesia channel model to examine the proposed framework. The 5G Indonesia channel model is in practice does not exist, however it can be a reference when making comparison of 5G channel model in several cities of Indonesia. This thesis considers operating frequency of 3.3 GHz with 40 MHz bandwidth based on the specification of orthogonal frequency division multiplexing (OFDM) numerology zero and the regulation from ministry of communication and informatics Indonesia about broadband wireless access in Indonesia.

The obtained outage performance of 5G Telkom University channel models are validated using bit error rate (BER) and block error rate (BLER) performance of cyclic-prefix orthogonal frequency division multiplexing (CP-OFDM) numerology zero with 5G complex binary phase shift keying (BPSK) and Polar codes. This thesis found that when foliage does not exist, the 5G Telkom University channel model has smaller number of path. The results show that foliage attenuation causes performance degradations indicated by smaller number of paths and worse theoretical outage performance.

The obtained outage performances of 5G Telkom University channel model are expected to be a reference of outage performance for 5G system implementation in Telkom University. Similarly, the proposed framework can be used to calculate 5G channel model in any locations in Indonesia such that an optimal 5G system implementation in Indonesia can be achieved.

Keywords: 5G, Channel Model, Capacity, Outage Performance, New Radio