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EMPIRICAL MODEL FOR PROPAGATION LOSS USING FLOOR SPACE INDEX FOR UNMANNED VEHICLES

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Abstract. The paper presents an empirical model for propagation loss, taking into account the floor space index value for urban areas in the frequency range 150 – 2000 MHz. This model is designed to be used for modeling communication and data transfer between unmanned vehicles in mixed groups consisting of a ground segment and an aerial segments. This work provides the description and analysis of the main existing models for radio wave propagation loss in different types of environment (urban, suburban, rural) including ones with the use of the floor space index values to calculate path loss between the receiver and the transmitter (base stations). The applicability of the main models to the conditions of unmanned vehicles operation has been evaluated, taking into account the height of the antennas of both the receiver and the transmitter, as well as the distance between them. Empirical expressions have been formed for the frequency range of 1000 – 2000 MHz based on known Hata (Okumura – Hata) and COST231 – Hata models in order to take into account the floor space index when calculating the path loss between aerial and ground terminals within the mixed group of unmanned vehicles.

Keywords: unmanned vehicles, smart city, path loss, signal loss, empirical model, CCIR model, Okumura model, Hata model, Okumura – Hata model, COST231 – Hata model, Ericsson 9999 model

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