ABSTRACT

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In this work, the location of devices is developed by using the circular register of the signal intensity received from the SFNs (Single Frequency Networks) ISDB-T (Integrated Services Digital Terrestrial Broadcasting). Thus, a radiofrequency signature (RF fingerprinting) from the field strengths in the area where want to provide the location service, performing simulations with the propagation model ITU-R-P1546 and generating a geo-referenced database. In this way,the signatures of each radial evaluated simultaneously for location determination using different measures of similarities, such as Mean Squared Error (MSE), circular correlation (CC), signal energy intensity (E) and artificial neural network (ANN) location estimation. The configuration of the transmission and reception systems is defined and different configurations of SFN networks are evaluated, both in relation to the number of transmitters, and their arrangement geographically. They are verified through the CDF (Cumulative Distribution Function) the position errors obtained, in meters, with each one of the measures applied, in order to verify which of the network configurations presents the best performance for the correct estimation of the location. It is shown that the proposal is feasible, evaluating the city of Rio de Janeiro and obtaining an average error of 85.3 m with an SFN network of 6 transmitters in an area of 635 km^2. In general, it is demonstrated that the increase of transmitters used by one or more networks performance improvement and the cross-device results in a fall in the performance of similarity measures, as well as the evaluation without True North orientation (NV), except for CC that disregard this information.

Keywords: RF Positioning, Neural Network, RF fingerprinting, Single Frequency Network, Signals of Opportunity.