

Experimental Validation of Multipoint Joint Processing of Range Measurements via Software-Defined Radio Testbed

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Abstract — In this paper we present an algorithm for multipoint positioning in multilateration (MLAT) radio navigation system and prove that taking into account redundant primary estimates such as sum of range measurements between the object of location and a pair of transceiver stations could improve single range accuracy estimation after joint processing with appropriate weighting coefficients. The approach for experimental evaluation is a testbed including four SDR-based transceiver stations, three of which perform primary measurements collection and one acts as the object of location estimation and measurement processing unit. Transceiver stations are working on National Instruments (NI) Universal Software Radio Peripheral (USRP) hardware with LabVIEW software, performing transmission, reception and processing of signals. Experiment was conducted in mobile scenario with slow pedestrian object of location movement and revealed position Mean Square Error (MSE) of one meter for range measurements with ten trial results accumulation.

Keywords — Analytical model, Distance measurement, Radar signal processing, Radio navigation, Software radio



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