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 joint processing of range measurements with trial results accumulation, evaluate its accuracy analytically in terms of range mean square error and finally validate it through an experiment. The methods used for analytical evaluation is matrix analysis and nonlinear least squares estimation theory. The approach for experimental validation is a software-defined radio (SDR) transceiver working on National Instruments (NI) Universal Software Radio Peripheral (USRP) hardware with LabVIEW software, performing transmission, reception and processing of signals. Presented solution was validated in static scenario and achieved position errors of several meters depending on the number of range measurement trials. The resulting error was substantially affected by synchronization uncertainty due to network organization of transceiver stations and measurement processing unit. However, in the conclusion we can state that joint processing of range measurements with trial results accumulation can substantially improve positioning accuracy and it was experimentally validated with software-defined radio testbed.**

Keywords — **Multipoint Joint Processing, Range Measurements, Software Defined Radio, Testded, Mean Square Error, Range Measurement, Field Trials, USRP, LabVIEW**

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