

Determining Times of Arrival of Transponder Signals in a Sensor Network using GPS Time Synchronization

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Abstract: In this paper, obtaining time of arrival (TOA) measurements in a sensor network is investigated. Differentiating these TOA measurements provides the Time Difference of Arrival (TDOA) measurements between sensor pairs. An approach is proposed to estimate the TOA at a single sensor in a semi-passive scenario. The theoretical investigation is supported by field trials. This experimental analysis pursues two main goals. First, experimental results demonstrate the feasibility of determining the TOA of transponder messages. Second, the quality of TDOA measurements strongly depends on the synchronization accuracy. Here, sensors are synchronized using GPS where an accuracy in the nanosecond range is achieved.