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Hybrid CFO-RSS Cooperative Positioning for Environments with Limited GNSS Visibility

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ABSTRACT

Cooperative Positioning (CP) techniques are the methods to enhance the performance of positioning through sharing any position-related data among a number of agents. These agents are usually the users with mobility and, may be, the infrastructure node(s). In CP systems, the data, which can be provided from different sources, are shared using a communication medium. Here, we focus on two types of data inherent in communication medium, Received Signal Strength (RSS) and Carrier Frequency Offset (CFO) to investigate how they can help positioning in the environments limited visibility of Global Navigation Satellite System (GNSS) signals. Regardless of the content of the data communicated among the agents, RSS and CFO always exist in the inter-agent communication signal. Therefore, the results of this work can be applied to improve the performance of any other CP method in which, position-related data are communicated. The results of this work show that the combination of RSS and CFO can improve the availability of GNSS-based positioning in the areas with limited visibility of GNSS satellites. The outcomes can also be considered for positioning enhancement for the users in under cover or dense urban areas.

KEYWORDS: CFO, Cooperative Positioning, GNSS, RSS.