Experimental Positioning Results of the Repealite Based Indoor Positioning System

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ABSTRACT

The continuity of the positioning service, mainly achieved outdoors with satellite navigation systems, is clearly a fundamental aspect for the development of location based applications and services. Indoors, many techniques are proposed but yet no definitive answers have been given. Our proposition for indoor positioning is a new pseudolite-based system: the repealites. A single GNSS-like signal is transmitted from all the repealites (typically 4 for 3D positioning) in order to simplify both the synchronization process (between transmitters) and the interferences between repealites. In addition, in order to avoid intentional multipath, the signals from different repealites are shifted in time by a few chips.

The paper will fully describe the set up and the results of an experimental campaign of measurements carried out in our premises in Evry, France, a few kilometers south of Paris. The main advantage of the repealite approach is the possibility to carry out both code phase and carrier phase measurements with a simplified transmission scheme. These two measurements allow us to carry out many different computations and hence comparisons. Among the most important ones, we can cite the direct code phase based positioning associated with a large impact of multipath on the positioning accuracy, although a quite efficient mitigation technique, the Short Multipath Insensitive Code Loop (SMICL), has been implemented. The next step is then to carry out carrier phase measurements and to compute relative displacement positioning through Doppler shifts analysis. Finally, we discuss real world performance of a positioning that combines code and carrier phase measurements through the implementation of a Kalman filter intended to provide positioning accurate to a few decimeters.

Details concerning the receiver and the associated algorithms will be given, together with the really obtained accuracies and experiment contexts.

KEYWORDS: Indoor positioning, Pseudolites, Repealites, Code phase, Carrier phase, Continuity of positioning.