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Title: ***Hybridization of GNSS with 5G and LEO-PNT for Positioning in Harsh Environment***

Abstract:

GNSS is the global standard for positioning, navigation, and timing (PNT) services, but its performance in urban environments is limited by signal obstructions and multipath, degrading the accuracy and reliability of high-accuracy positioning and the deployment of smart city applications.

This work explores the integration of complementary technologies to improve PNT services. We propose a multi-layer solution based on the integration of GNSS with 5G, which provides advanced positioning features, and LEO-PNT satellites, designed to deliver high-accuracy PNT from low Earth orbit.

A software platform has been developed to jointly process real GNSS and 5G measurements together with synthetic LEO data, using an Extended Kalman Filter (EKF). Tests under different conditions demonstrate that this hybrid approach improves positioning performance and significantly enhances accuracy, especially for Precise Point Positioning (PPP).