

Mobile Communication Signal Selection Algorithm for Signal of Opportunity Navigation

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Abstract—At present, the satellite navigation and positioning system can provide a high precision positioning service to end users in outdoor environments. But in urban canyons, high rise buildings, urban tunnels, tree canopy covered areas, and other environments with weak signal such as military base and other special places with signal disturbance or spoofery, effective positioning or positioning results cannot be trusted. Hence, it is very important and meaningful to use the existing radio signals (“signal of opportunity”) in the environment for positioning. Among the existing types of signals, mobile communication signals have more obvious characteristics for signal of opportunity navigation and thus has received more attention. This paper aims to solve the problem of signal selection in the application of mobile communication signals to navigation and positioning. This done by using characteristics such as signal carrier frequency, received signal strength and geometric position distribution to model, evaluate and systematically analyze the influence of each factor on positioning performance. Finally, based on a comprehensive evaluation method, a signal selection algorithm is designed while putting the signal type, signal carrier frequency, received signal strength, geometric position of the signal source and other factors into consideration. GSM and LTE signals are used in an actual environment to analyze, verify and extract the parameters required for the selection algorithm, also a comparative verification analysis was carried out with cluster and sub-optimal selection algorithm. The positioning accuracy of the proposed model proves both the reliability and the effectiveness of the proposed algorithm for comprehensive evaluation of signal source selection.



Keyword— Mobile Communication Signals, Navigation and Positioning, SDR, Signal Source Selection

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