Geometrical Positioning Schemes for MS Location Estimation

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Abstract

To achieve more accurate measurements of the mobile station (MS) location, it is possible to integrate many kinds of measurements. In this paper we proposed several hybrid methods that utilized time of arrival (TOA) at seven base stations (BSs) and the angle of arrival (AOA) information at the serving BS to give location estimation of the MS in non-line-of-sight (NLOS) environments. From the viewpoint of geometric approach, for each a TOA value measured at any BS, one can generate a circle. The MS position is then given by the intersections of the circles from multiple TOA measurements. Rather than applying the nonlinear circular lines of position (LOP), the proposed methods are easier by using linear LOP to determine the MS. In addition, the proposed methods can mitigate the NLOS effect, simply by applying the weighted sum of the intersections between different linear LOP and the AOA line, without requiring priori knowledge of NLOS error statistics. Simulation results show that the proposed methods can always yield superior performance in comparison with Taylor series algorithm (TSA) and the hybrid lines of position algorithm (HLOP).

Keyword：time of arrival (TOA); angle of arrival (AOA),