

Geometrical positioning schemes based on hybrid lines of position

陳見生, 林君明, 劉文雄, 紀慶隆

Communication Engineering

Engineering

jmlin@chu.edu.tw

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 simpler methods that utilized time of arrival (TOA) at three 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. Rather than applying the nonlinear circular lines of position (LOP), the proposed methods are much easier by using linear LOP to determine the MS. Numerical results demonstrate that the calculation time of using linear LOP is much less than employing circular LOP. Although the location precision of using linear LOP is only reduced slightly. However, the proposed efficient methods by using linear LOP can still provide precise solution of MS location and reduce the computational effort greatly. In addition, the proposed methods with less effort 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), Non-line-of-sight (NLOS)