

Analysis of Positioning Accuracy corresponding to the number of BLE beacons in Indoor Positioning System

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Abstract— In these days, a technology that utilize of Bluetooth Low Energy (BLE) beacon, has been attracted attention to provide variety of convenience services. Especially, not limited to the service that can assist to people directly such as public safety, healthcare, proximity-based service, mobile payment, etc., a technology that can provide convenience indirectly such as asset tracking has also been proposed. Most of all, the indoor location awareness using BLE beacon is the essential technique that can realize these services, it is expected to be more focused if the more BLE beacon is spread in the future. In this paper, we first analyse practical path loss model of BLE signals with compared to that of Wi-Fi signals in order to take advantage of the BLE beacon for indoor positioning. To estimate the practical path loss model, we employed four BLE beacons (each two beacon is the same manufacturer) and two of Wi-Fi AP. Each signal was measured during one minute at each reference distance from 1m to 13m (with 2m interval) in a Line-of-Sight (LOS) environment. The calculated path loss model was used to generate a BLE signal virtually, we applied the model to configure the BLE radiomap and generate positioning measurement data in our simulation. Since BLE signal has relatively lower tx power compared to Wi-Fi APs, it requires much more beacons to achieve comparable positioning accuracy. We focused on the relationship between the number of installed beacon and its positioning accuracy in this paper.

(Pt9)Keyword— Indoor Positioning, Bluetooth Low Energy, Positioning Accuracy, Practical Path Loss Model, Radiomap-based Positioning



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